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THE IRON AGE

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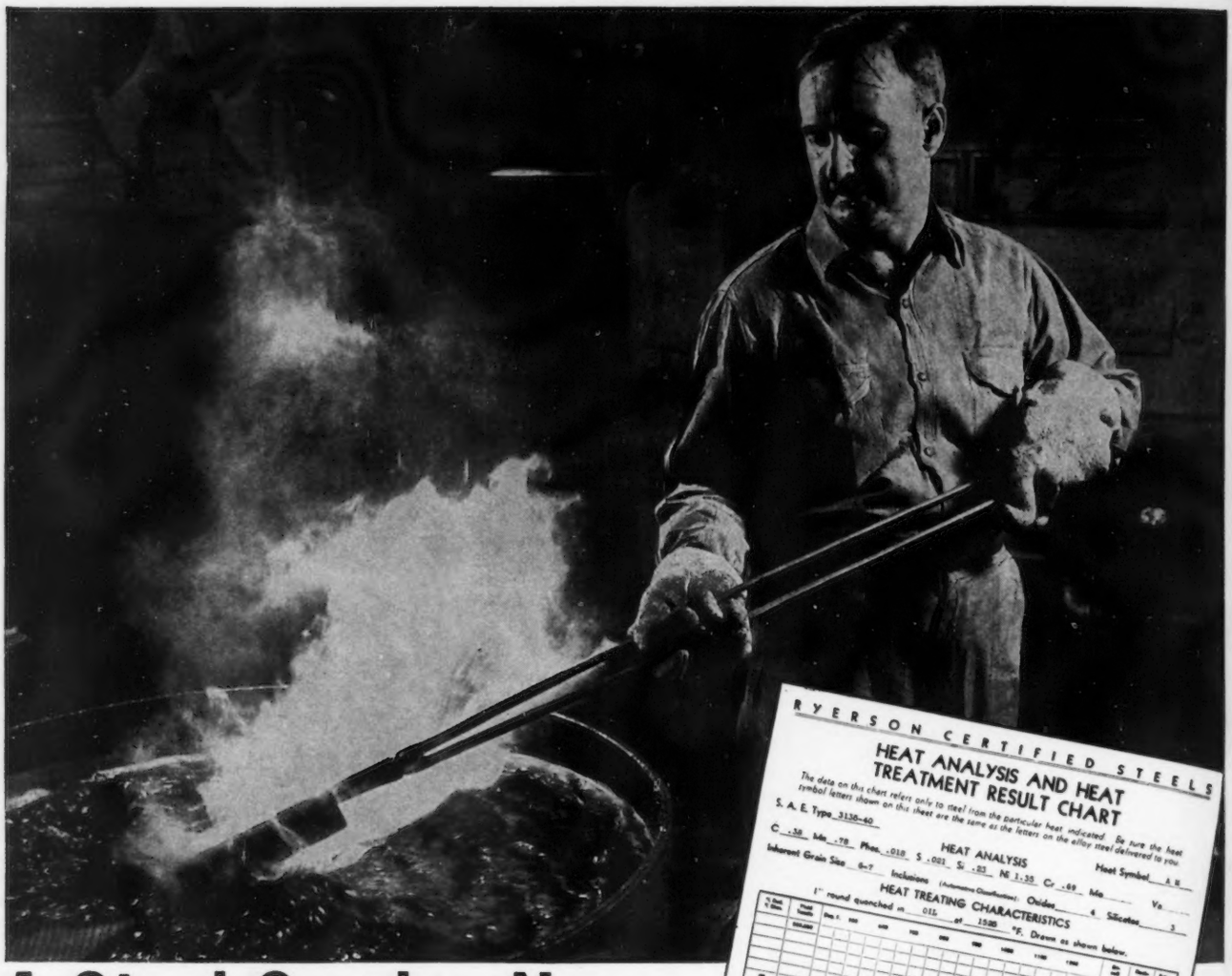

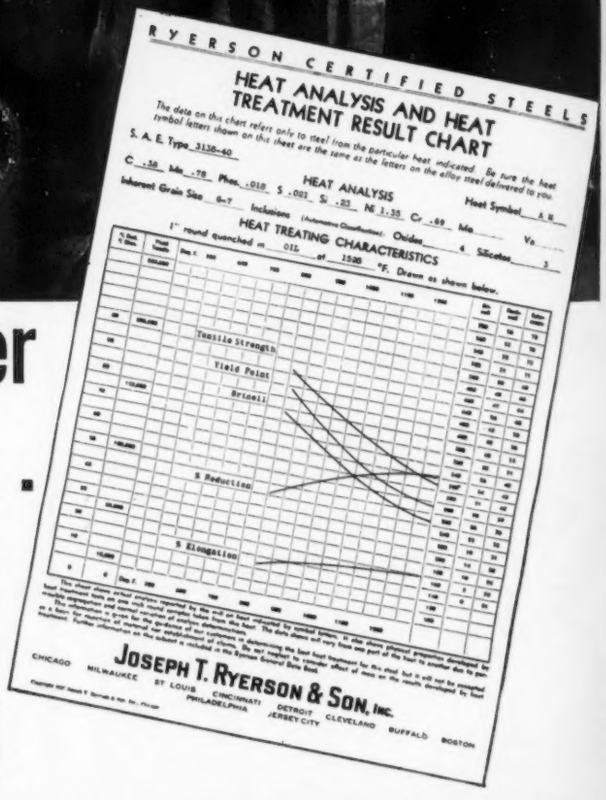

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FEBRUARY 2, 1939

ESTABLISHED 1855 Vol. 143, No. 5

Square Pegs; Round Holes

I HAD an interesting experience a few weeks ago which emphasized the fact that the world is not so large after all and also that strange things happen to the people who inhabit it.

The occasion was a visit to the plant of one of America's largest aircraft concerns. It was, as you might expect, a busy place. Several thousand men and several thousand of the finest machine tools in America were busy turning out a product—aircraft engines—which is probably the acme of all modern precision products, bar none. Instrument making on a mass production basis is the nearest to it that one could think of.

Naturally a plant of this kind has some pretty high grade people managing it. The production and engineering problems encountered in this sort of work call for the best talent that can be had.

I was interested in meeting these people and talking with them and particularly with one gentleman in his early 40's whom I will call Mr. X. "Oh, yes, I know Mr. Van Deventer," he said when introduced, "in fact I worked for him some 18 years ago."

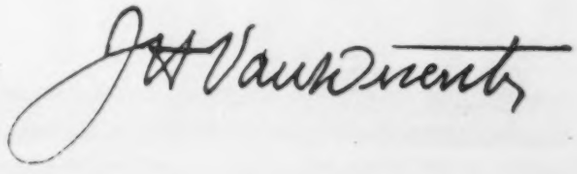
That was news to me, for I did not recollect it. Which was quite understandable, perhaps, since Mr. X had worked for me only a few days. It did not take longer than that to find out that this young engineer was a square peg in a round hole insofar as the publishing business was concerned. So I had persuaded him to seek other pastures.

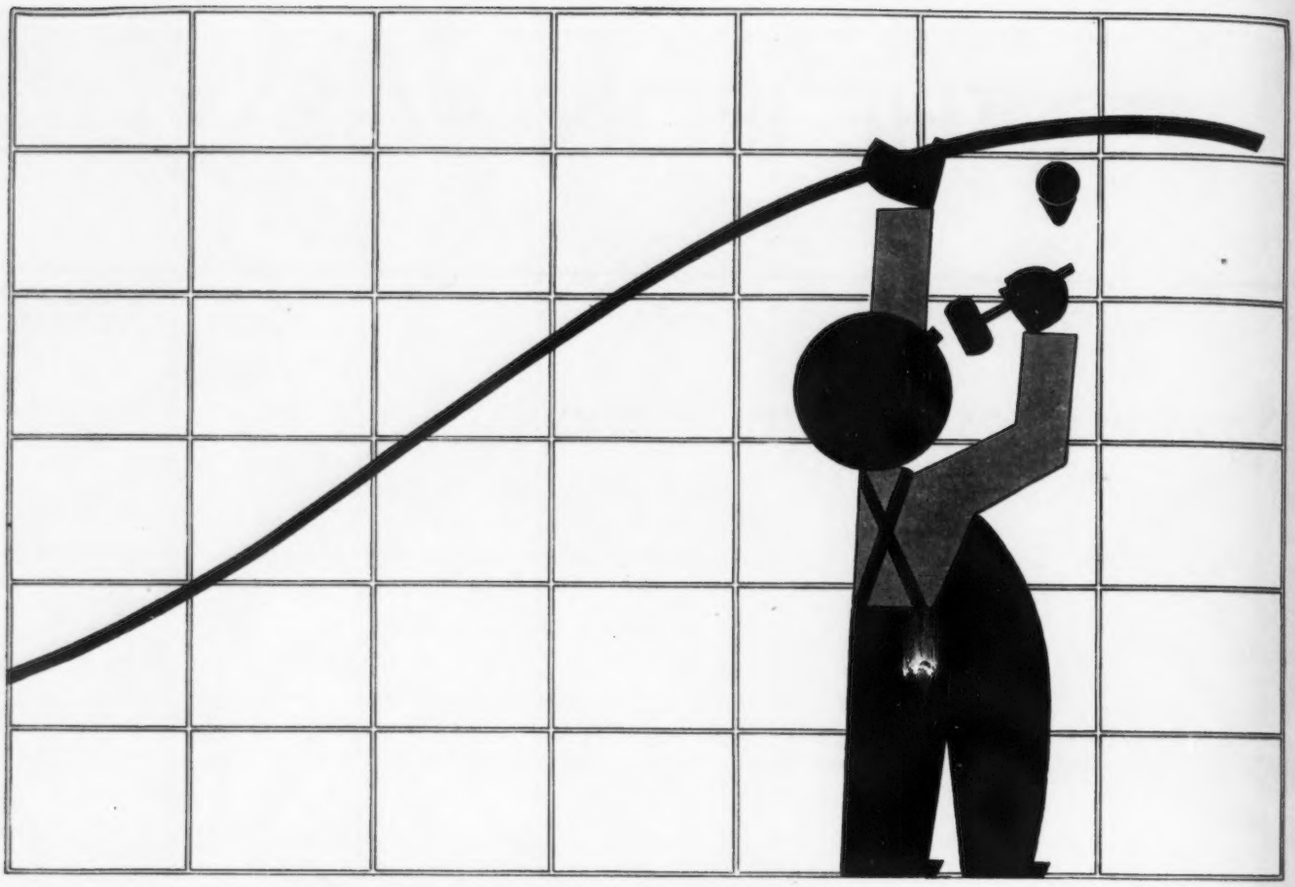
I could tell by looking at X that he was one of the "brass hats," but I could not tell just what size he wore. So I asked him what position he occupied. "Oh, I'm the chief engineer," he replied.

Believe me, that was a surprise! Eighteen years is not such a long time, but it can bring about plenty of changes. It certainly had in the case of my friend X. Eighteen years had transformed him from a third rate editorial cub to a top place in the engineering profession.

That just goes to show what happens when you match the pegs and the holes. What a great thing it would be if we did not have to leave so much of that to chance.

I sat alongside of Mr. X all through dinner and he did not seem to have any hard feelings toward me for getting him out of the publishing business.





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SHEETS STRIP TIN PLATE BARS PLATES FLOOR PLATES STRUCTURALS PILING RAILS TRACK ACCESSORIES REINFORCING BARS

The Mill on the Hill . . . An Achievement in Materials Handling

By FRANCIS JURASCHEK
Consulting Editor, The Iron Age

BACK of the quiet little village of Dravosburg, Pa., on a hillside above the Monongahela River and in the very heart of the Braddock-McKeesport-Clairton-Donora district, a dream has come true. Not a castle-in-Spain kind of a dream — fantastic, wistful, compensatory — but a hard, cold, practical dream, rooted in the desire of forward-looking men to produce steel sheet, strip and tin plate in the most efficient way.

Here 15 miles or so south of Pittsburgh's golden triangle and hard by the huge airport, more than 10 years of intensive planning and millions of dollars worth of concrete and structural steel, electric motors and gargantuan machinery have finally turned imagination into a working

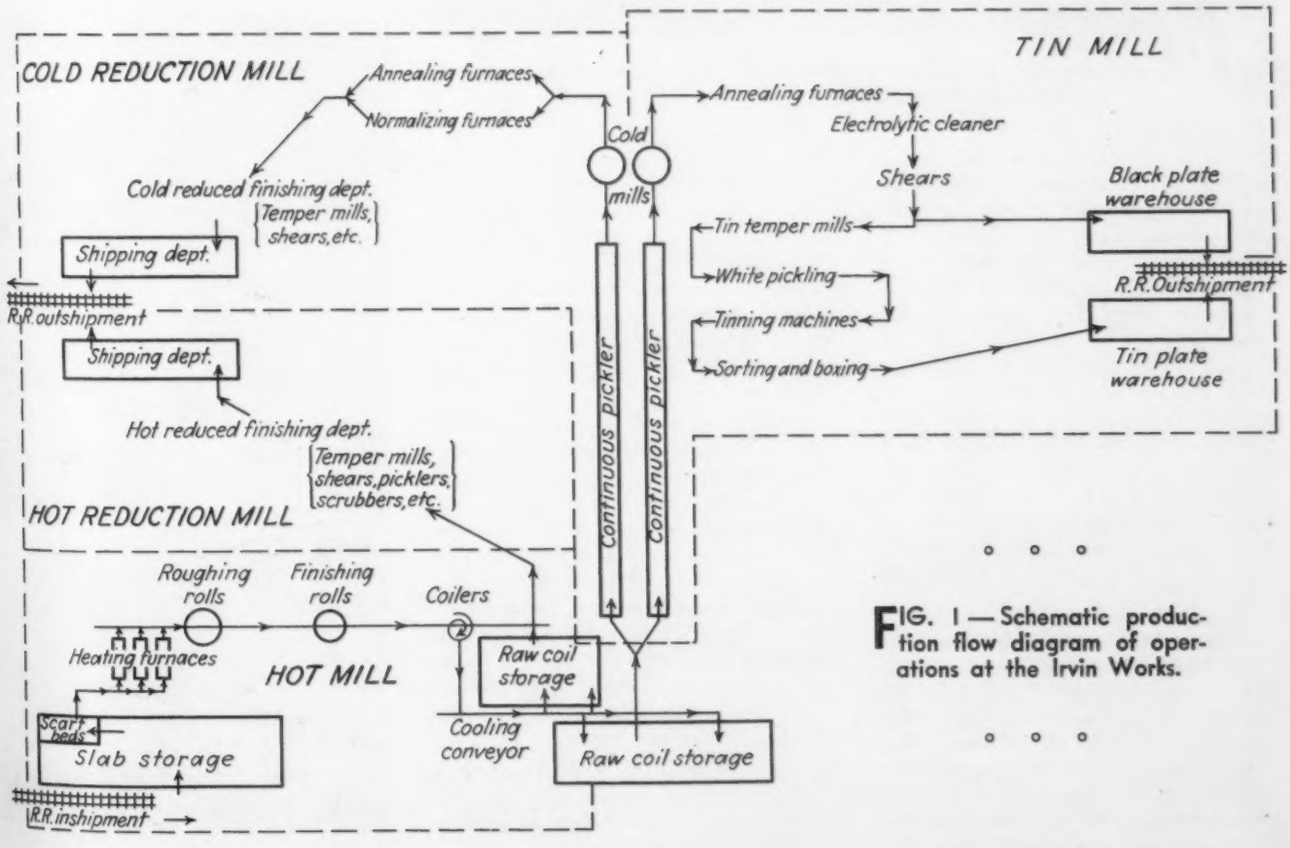


FIG. 1 — Schematic production flow diagram of operations at the Irvin Works.

FIG. 2—Feeding slabs to the pusher-rams at the intake ends of the heating furnaces. The beginning of the hot mill cycle.

reality—the Irvin Works of Big Steel.

It is not particularly exciting these days to read about the opening of a new industrial plant. So often have rolling mills been built in the past few years that announcements have become almost as natural an event as toast with breakfast coffee. But Irvin happens to be different. It is not only new and big and filled with advanced technological ideas—these things have been said just as truthfully about other mills lately—but it also happens to be the embodiment of a very common sense principle. It is the incarnation of a production ideal—straight-line flow.

This is news in the steel industry. Not because the principle of straight-line flow is revolutionary (on the contrary it is the basis of all mass production effort), but because it has always been so difficult to apply consistently in the flat rolling of steel. The strict application of the principle requires *space;* more space than seems to have been economically available in other mills. So the application of the principle has always been in more or less half-way measures—until Big Steel's engineers dreamed the Irvin Works, and spread it out over a mile and more of a sprawling hillside above Dravosburg.

There's a story back of this achievement that merits thought; a story the whole steel industry is taking to heart. For, basically, the fulfillment of Big Steel's dream in the Irvin Works is due, more than any other single factor, to a consistent and conscientious application at every step of the production problem, of the art of moving materials mechanically. More than any other one thing in the whole project, the materials handling methods and equipment brought into play at Irvin tell the story of more efficient production.

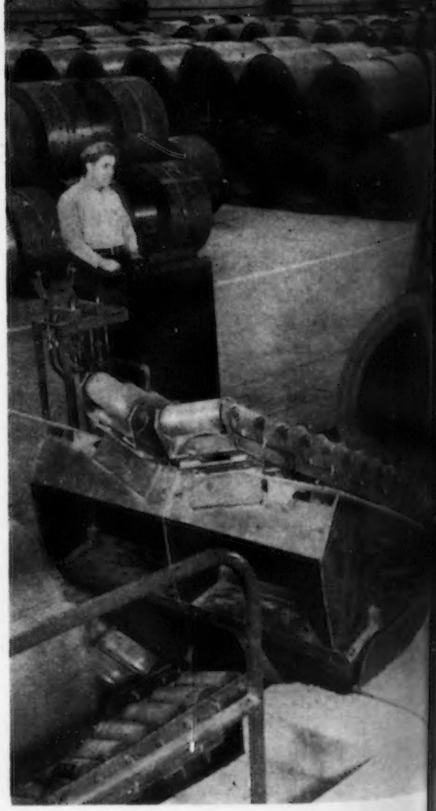
Statistics are notoriously unimpressive these days. But two figures are worth bearing in mind in connection with the Irvin Works. Into its gates there will come from the Edgar Thomson plant at Braddock, six miles to the north, a supply of steel slabs sufficient to enable Irvin to roll 600,000 gross tons of sheet and strip product every year. If the entire capacity of Irvin were to be utilized to turn out a single ribbon of 48-in. wide, 20 gage steel, that ribbon would reach at least 10 times around the earth at the equator each year.

Thus, it may be appreciated that handling materials at Irvin is no child's play.

The Production Flow

The scheme of production flow at Irvin may be visualized in simple terms if the general objectives are kept firmly in mind. These all start with a common denominator—slabs shipped in from Edgar Thomson—and pass through a common initial production step; hot rolling. Then come three distinct split-ups. If hot reduced strip or sheet is desired as the end product, one line marches through the hot reduction finishing department directly to a shipping

FIG. 3—Down tilter at end of 1270 ft. section roller conveyor to



room. If cold reduced strip or sheets, or tin mill products are desired, the line runs through continuous raw coil pickling tanks and cold reduction mills, where one phase splits off through the cold reduction finishing department to a shipping room adjacent to the hot reduced product shipping room, while the other line flows in the opposite direction to occupy the tin mill space at the southern end of the Works. This general scheme is shown in very much simplified detail in Fig. 1.

From this diagram (not to scale, but roughly approximating the different directions of flow throughout the plant) it is clear that a slab once received and started on its way marches inevitably *forward* step by step, with a minimum of lost motion. And this is the first cardinal point of efficient handling.

The second point—a minimum of handling operations between successive process steps—requires a more detailed examination of these lines of flow. For convenience in description, the operations will be considered in four parts, roughly corresponding to the four operations of the Works;

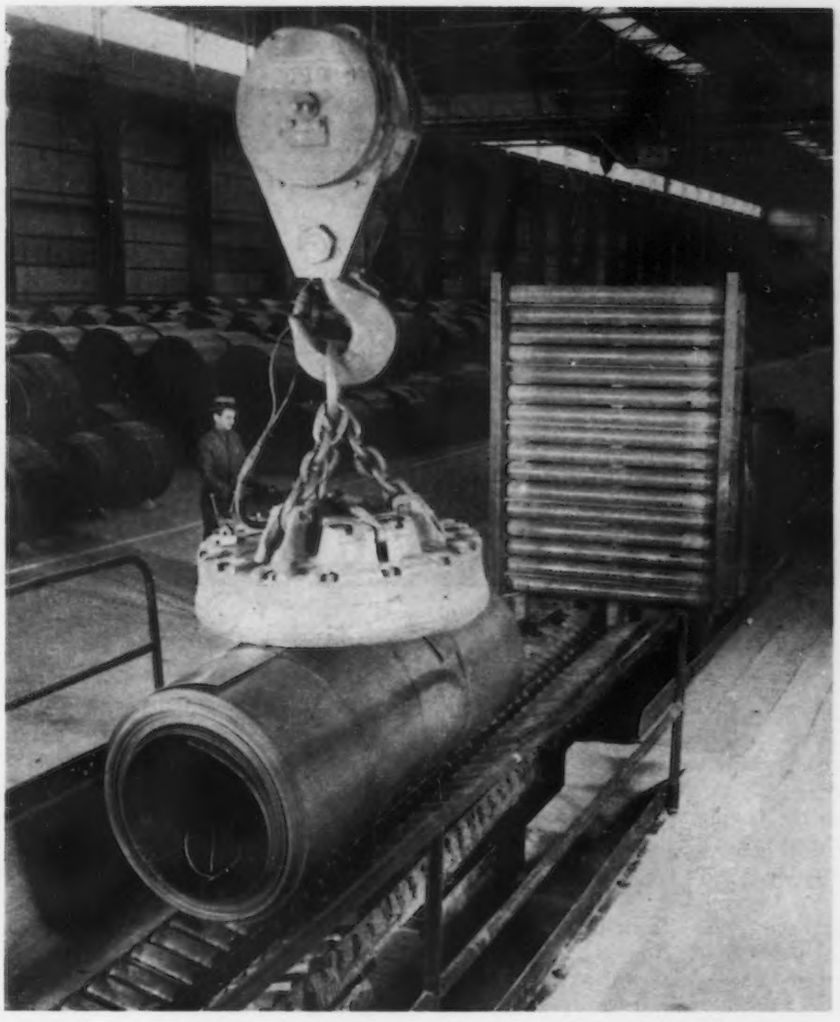


FIG. 4—Magnet crane removing coils to raw coil storage rooms from the trough section roller conveyor.

cooling conveyor transfers coils to trough- facilitate further handling.

first the common step of hot rolling, then separately, hot reduced finishing, cold reduced finishing, and tin plate manufacturing.

Hot Rolling

As the slabs are brought in on railroad cars from the Edgar Thomson Works they are lifted by overhead traveling crane and deposited in neat piles according to size and type in the slab storage room. Thence, after flame scarfing, where handling is done by a gantry crane, they are placed in piles on a chain conveyor which runs across the intake ends of three continuous heating furnaces. Individual slabs are fed into the furnace from this conveyor by transverse pushers, each slab pushing the slab ahead of it through the furnace and out onto the roll conveyor feeding the continuous hot strip rolling mills.

From this point the hot mill cycle is much like that at any other mill—scale breaker, four roughing stands, crop shear, another scale breaker, six finishing stands, flying shear, run-out tables, coilers and piler. The hot mill can roll strip to a maximum width of 77 in., and the nominal rated capacity of this mill (which controls the entire capacity of the Works) is 600,000 gross tons per year.

At the end of the hot mill line two coilers discharge to a short section of transverse chain conveyor, the carrying plates of which project but a few inches above the floor level. This transverse conveyor discharges the up-ended coils at right angles to a 1270 ft. long chain cooling conveyor; a new practice in rolling mill procedure. Like the transverse section just mentioned, the carrying plates of this conveyor run only a few inches above the floor level, so that coils may be removed from the line at any time without damaging the ends. This cooling conveyor is

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FIG. 5 — Ram truck taking coil from pickling tank discharge conveyor line to the cold reduction department.

o o o

literally a moving sidewalk, capable of handling the entire production of the hot mill in coil form, and transferring it to the two raw coil storage rooms while moving at a speed of between 15 and 17 ft. per min. Close to the beginning of this cooling line the conveyor passes through a scale section where the coils are weighed.

As the coils are discharged onto the transverse line from the coilers, the strip is checked for width and thickness. These data, with the weight, order numbers, heat numbers, etc., are chalked on each coil; and these operations, together with the banding of the coils at the point of discharge from the coilers, mark the only stage from slab to raw coil storage room where it is necessary for human hands to touch the steel.

At either side of the cooling conveyor are located the raw coil storage rooms, and at appropriate points along the line, down-tilters or ram-pushers are located to discharge the coils on their sides or ends, as required, to these storage rooms. In each room overhead magnet cranes pick up the coils and set them down as desired in the storage rooms. This finishes the first, and common step, in the production of all the various products at Irvin.

Throughout each stage of the progress so far, swift, time-saving mechanical handling has replaced human muscle. The flow-line has marched forward continuously, and re-handling of any sort has been completely eliminated. From this point on, as various kinds and sizes of finished product are manufactured, the ways inevitably become more complicated; but even so, great things have been accomplished in the matter of reducing these complicated lines of flow to the simplest possible terms, involv-

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FIG. 6 — Stack carrier handling bundles of sheet metal between various operations in the cold reduction finishing department.

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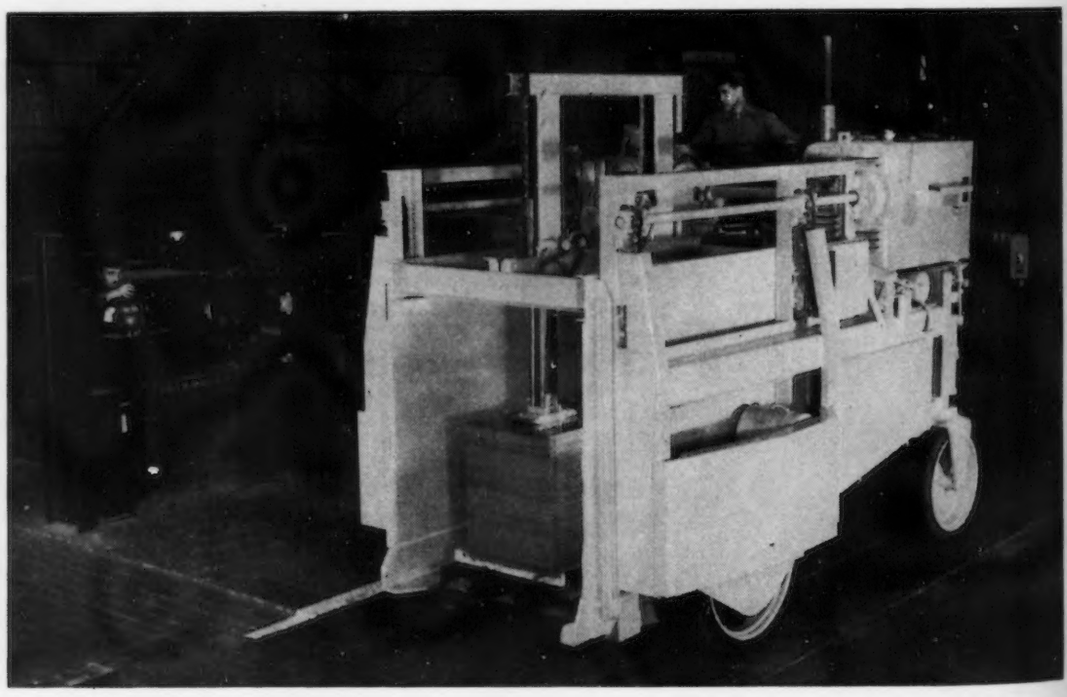

ing the least possible amount of handling, at the lowest possible cost. Brief outlines of these procedures follow.

Hot Finishing and Cold Reduction

From the east raw coil storage room, coils are picked up by ram-type industrial trucks or by overhead cranes and transported to various pieces of hot reduction finishing equipment, in the hot reduction department, or, if desired, strip may be handled here as it comes direct from the hot mill. In this department are installed flying shears, resquaring shears, temper mills, recoiling and side-trimming lines, a sheet pickler and scrubber. Wherever possible, the equipment has been laid out to function in continuous straight-line flow. When this is possible, conveyors connect one machine with another, to make handling automatic. Where jumps from one piece of equipment to another around an intervening machine become necessary, ram trucks handle coils, or fork trucks or stack carriers or overhead cranes equipped with special sheet grabs handle piles of sheet metal. Careful planning of movements *before* the equipment was set in place has resulted in an extremely small amount of actual handling work in getting out the hundreds of different sizes and shapes and weights of product required from this department.

The line of flow marches inevitably onward toward a shipping department, with no back-tracking of goods anywhere. This shipping department is located adjacent to a similar shipping department serving the cold reduced finishing department, and both are equipped with adequate facilities for shipping out by rail or highway truck, with industrial trucks and overhead cranes to do all the handling work.

Coils for cold reduction and for tin plate are picked up in the raw coil storage rooms by magnet crane or ram-type industrial trucks, and delivered direct to the uncoilers at the receiving ends of two lines of continuous pickling tanks, one line capable of handling strip up to 38 in. widths, and the other up to 77 in. widths. At the far ends of these pickling lines the recoiled strip runs out on lines of gravity roller conveyors to a point where ram trucks pick them up for delivery to the cold reduction mills.

It is in going through the cold reduction mills that the flow lines for cold finished products and for tin plate stock split. The first line goes through a 3-stand tandem mill with a capacity of 200,000 tons of strip per year, designed to handle open hearth, Bessemer, Cor-Ten, Man-Ten, Sil-Ten and stainless steels in widths from 18 in. to 77 in. When required, a 4-high reversing mill may be used here.

The cold reduced material is moved from the mills by crane or industrial truck either to a recoiler line which side-trims 16 gage or lighter material in strip form, or to three flying shears equipped with roller levelers, side-trimmers, etc., followed by drum-type shears, where the strip is cut into lengths ranging from 30 in. to 15 ft.

The coils or sheets are placed by cranes on transfer cars and moved in bulk to the annealing furnaces. From these furnaces similar cars take the annealed metal to the cold finishing department proper, where there are located three 4-high temper mills, two for strip and one for sheet alone, and also a 2-high temper mill arranged for either sheet or strip. With these mills are located various pieces of miscellaneous finishing equipment, such as roller levelers, stretcher levelers, squaring shears, oiling machines, flying and resquaring shears, and a combination open annealing and normalizing furnace.

All through the cold reduction finishing department such a degree of care has been exercised in laying out the sequence of operations and in spotting the equipment in the most favorable locations, that handling has been reduced to a minimum. Wherever possible, conveyors connect one machine to another, and otherwise, industrial trucks, stack carriers and overhead cranes come into play. So closely have operations been tied in to each other that even where handling equipment must be used, its use has been reduced to an amazing degree.

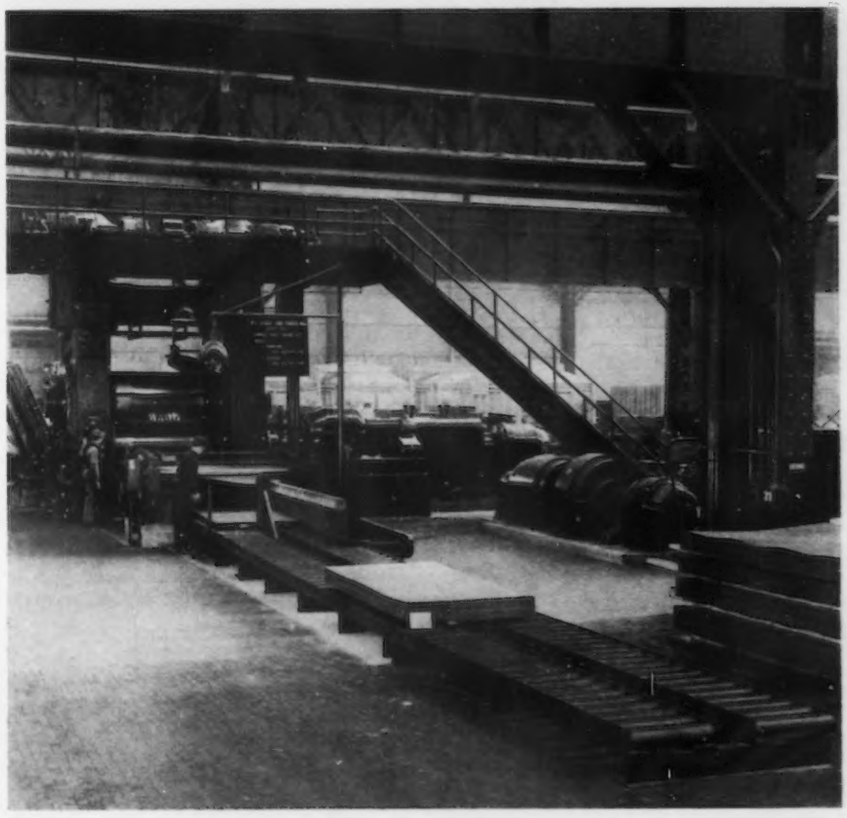

FIG. 7—Typical roller conveyor connection between temper mills and sheet finishing equipment.

The Tin Mill

Cold rolling for tin plate products is done either in a 5-stand tandem 4-high mill, or in the 4-high reversing mill; both of which are located adjacent to the cold reduction mills for non-plated metal mentioned above. From the cold mills, the coils, which for tin mill use are from 16 in. to 38 in. wide, are taken by ram

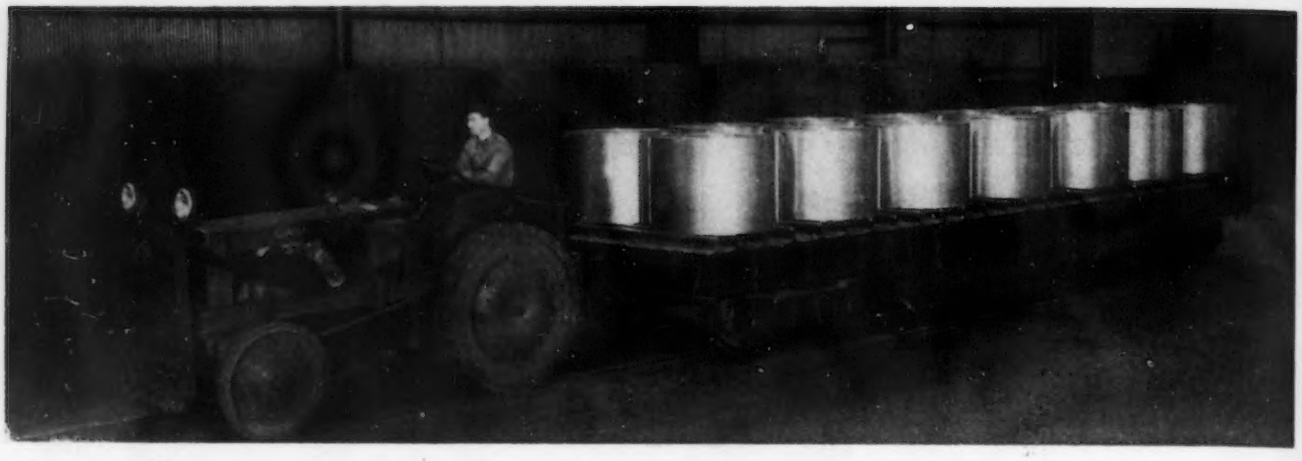

FIG. 9—Tractor moving transfer car loaded with black plate coils to the annealing furnaces.

truck to three electrolytic cleaning lines. On leaving these cleaning lines the coils are handled by crane and transfer car to the annealing furnaces, thence by transfer car to the temper mills. From these mills the coils are handled by truck to the shearing machines, where the strip is cut into tin plate sizes.

Sheared tin plate metal, stacked in piles, is then moved by fork truck to the batch white-picklers (except for such metal as may here be diverted to the black plate warehouse). The sheets coming from the pickling tanks are stored in batches, on edge, in bosh containers, where the metal is kept under water until it is ready for the tinning operation. A special type of industrial lift truck is used here to pick up the bosh tanks bodily with their loads of water-covered sheets, and to transport them to the tinning pots.

At the tinning machines, which are specially designed straight-line units, the sheets are picked up out of the bosh tanks by revolving permanent magnets and fed individually to the tin plating tanks, from whence they are mechanically delivered to the bran-dryers and polishers. Here they come out stacked neatly in piles, all ready for inspection, assorting and packing. Nothing has yet been found to take the place of sharp-eyed, nimble-fingered girls for these final operations. After the inspection and sorting, the finished tin plate is packed in base boxes, which are picked up by fork trucks and delivered to the south shipping room, ready for the final counting, checking and shipping out by rail or motor truck.

Once again, an inspection trip through the entire tin mill leaves the distinct impression that handling has been reduced to a minimum, that straight-line flow principles have been worked out in a very logical manner, and that costs have been minimized quite as much by the application of sound mechanical handling methods as by any technological advances in production operations themselves.

FIG. 8—Special type industrial trucks lift bosh tanks filled with water-covered sheets, to carry them to the tinning pots.

Summary

For those who delight in statistical information the following general summary of the principal materials handling equipment in use at the Irvin Works will be interesting. There are 50 overhead cranes, varying in capacity from 5 to 60 tons, and in span from 60 to 120 ft. Some 17 miles of standard gage railroad track have been or will be laid within the limits of the plant site, a large part of this within the buildings proper. Of conveyors, more than 1600 feet of chain type conveyor is in use, and approximately 5500 feet of roller conveyor, exclusive of run-out tables built as an integral part of the production equipment.

There are 42 industrial trucks of various types in use, about evenly divided between storage battery and gasoline-electric drives. In addition there are several gasoline-powered tractors, six stack carriers of special design, a dozen special crane-hoist sheet grabs, and eight magnets used in connection with overhead crane service.

Shearing, Blanking, Drawing, Spinning, Forming and Riveting of STAINLESS STEEL*

FOR drawing stainless steel, the design of the part to be formed and the number of pieces to be produced govern the selection of materials for dies.

Some shops on short runs use a low-carbon alloy steel, case hardened, but in most cases these applications are for rolling machine dies. Such dies will not permit any great amount of redressing, because in so doing the hardened surface case is removed.

Because of the high tensile strength of stainless steels, combined with their high alloy content and toughness, it is advisable to use first class tool steels. For blanking and punching dies, also shear blades, steels of the cobalt-chromium type or steels with similar high alloy content are recommended. Some manufacturers use hardened die steels for small intricate dies where retention of close tolerances is a factor.

Draw rings and pressure or hold-down pads of alloyed cast iron or hard alloyed bronze have proved of greater value than ordinary cast iron. A typical analysis and best treatment of alloyed cast iron is: Carbon, 3 per cent; manganese, 0.75; silicon, 1.20 to 1.50; chromium, 0.75 to 1.00; and nickel, 2.50 to 3.00 per cent. This iron is heated to 1550 deg. F. uniformly, oil quenched and drawn immediately to 900 deg. F. The resulting Brinell hardness is 280 to 340.

It will be found, however, that hard cast bronze rings will result in a much more satisfactory product, particularly in the elimination of scoring. In fact, bronze is almost imperative where the product is to be polished after drawing.

Blanking and Shearing

Stainless steels cannot be sheared with the same clearance used on ordinary sheet steels. The metal must be cut through the entire thickness. It will not snap or break off as will other materials. Hence, it is suggested that the shear blades be maintained with very close adjustment and with as keen an edge as conditions will permit. Dull shear blades used in trimming a narrow margin on light gage metal will have a tendency to drag and turn over the edge of the metal instead of parting it from the sheet. This condition also holds true in slitting strip coil stock. If the cutters are not regularly ground to a keen edge and maintained as such, the dullness of the edges will have a tendency to cause considerable camber and burr, unless sufficient tension is maintained between the pay-off and recoiling reel.

The pay-off reel should be an adjustable type to permit the arms or holders to grip firmly the inside diameter of the coil. A brake drum arranged on the reel to adjust the proper tension and prevent free running of the coil will assist greatly in preventing cobbles and damaged surfaces.

Unless otherwise noted on the sheet, the inspection stamp will be on the prime side in all cases. In coil stock the prime side will be on the outside of the coil. This information is of help to those desiring to use this side for polishing or finishing.

In blanking or punching, a much closer clearance should be maintained to eliminate dragging the metal and causing burred edges. Definite figures cannot be given and will vary according to the thickness of the materials. Some shops work to a clearance of one-tenth the thickness of the metal. For example, in using 0.010-in. gage material, it is desired to punch a hole ¼ in. (0.250 in.) in diameter. Therefore the die diameter should be 0.250 + 1/10 (0.010) = 0.251 in., or possibly as much as 0.252 in. The reverse of this is equally as feasible. Use a die of 0.250 in. diameter and a punch of 0.248 to 0.249 in. in diameter.

Caution should be exercised in the

* Condensed from the booklet "The Fabrication of Republic Enduro Stainless Steel," shortly to be published by Republic Steel Corp.

o o o

APPLYING lubricant to stainless steel prior to the first drawing operation.

o o o

elimination or removal of the burr encountered during blanking or shearing. In some cases the burr is quite a factor in retarding the flow of the metal between the draw ring and pressure of hold-down pad.

Burrs encountered in stainless steels are hardened to such a degree that in passing over the surface of the die ring or pressure pad, unless the dies are of extremely high hardness, the surface will be gouged or scratched.

Lubrication

Before placing the blank in the draw dies, a lubricant of high film strength and adhesion qualities should be applied. A brush, swab or spray gun should be used to apply the compound uniformly over the surface subject to friction. Several special stainless drawing lubricants are obtainable from various producers, with offices and warehouses throughout the country. The most suitable have either an oil or animal fat base, highly sulphurized, which can be diluted to proper consistency for the particular operation. If the draw operation is light and of shallow depth, a water soluble solution will suffice. If draw is heavy, oil soluble solutions or similar preparations are preferred due to their greater adhesion properties.

Drawing

In drawing, it should be remembered that stainless steels require considerable more power and more rugged equipment than ordinary steels.

Enduro 18-8[1] with its exceptionally high elongation is very excellent for deep drawing and difficult forming operations. Due to its rapid work hardening properties and physical characteristics, however, it requires greater force to displace, or approximately double the energy used for ordinary steels. All steels of higher alloy content are sluggish to flow either in hot or cold forming. A speed approximately one-half that applied in regular draw work will result in flowing the metal to a greater depth and will eliminate excessive breakage and scoring of the dies.

Pressure pads should be adjusted to exert greater force on the blank to prevent any wrinkling or folding of the metal flowing into the draw ring. If wrinkling is permitted to occur, the draw ring may be damaged or the bottom of the shell fractured.

The clearance between the punch and draw die should be about twice that used on ordinary steel or brass and the radius of the draw ring should be greater and the ring well polished, buffed if possible. Oil stones and kerosene should be used in preference to abrasive cloth or similar materials in removing adhesions or metal adhering to the draw ring or pressure pad.

Blanks in all cases should be of sufficient diameter to retain a flange on the shell. If the drawn part is produced without this precaution, season cracking of the sidewalls may result, particularly if the reduction is excessive, unless the parts are immediately washed to remove the drawing compound and then annealed. If the part produced requires a second draw or additional operations, it is advisable to remove thoroughly the drawing compound and to anneal the parts.

The 18-8 grade of stainless, with its higher ductility, can be reduced approximately 40 per cent of the blank diameter. Greater reductions are possible, governed by the speed at which the metal flows through the draw ring and the consistency of the lubricant applied.

The straight-chromium types of stainless, such as Enduro AA[2], are lower in ductility, the average reduction being approximately 25 to 30 per cent. The percentage reduction is influenced by the thickness of the materials. The same precautions are to be observed in fabricating the straight-

THE blank has been given one draw second

o o o

AT RIGHT

THE stainless steel blank has been being

[1] Republic's Enduro 18-8 analyzes 0.08 to 0.20 C, 17 to 19 Cr, 7 to 9 Ni, 0.75 max. Si, 0.60 max. Mn, 0.030 max. S, and 0.030 max. P.

[2] Enduro AA analyzes 15 to 18 per cent Cr and 0.10 max. carbon. It is used where corrosion resistance is more important than high strength or toughness.

chromium types as outlined for the 18-8 analysis, although as previously explained the ductility of this analysis is lower and therefore requires additional annealing, which is accomplished at a lower temperature than that for the 18-8 type.

Cleaning

The cleaning of drawn parts depends on the type of lubricant used. Oil base lubricants can best be removed by washing or cutting with kerosene, followed by a caustic soda or similar type of industrial cleaner or degreaser. In all cases be certain that the pigment or solid matter from the lubricant has been thoroughly removed from the surface of the metal. If soap base lubricants are used, boiling water or commercial cleaners will remove the adhering film of the lubricant without resorting to the use of kerosene.

It is very essential that the surface of the parts be thoroughly cleaned of any trace of grease or dirt. Parts should then be handled with clean gloves or tongs, since any smudge or spots, if permitted to remain on the surface of the parts to be annealed, will be burned into the steel.

and is now being lubricated for the draw.

o o o

spun to shape and the edge is now flanged.

Spinning and Forming

Spinning has been thought by many fabricators to be an insurmountable problem, but such fabrication of large stainless steel coffee urn tops and similar products is now being accomplished without difficulty with the 18-8 grade.

If the spinning is deep, one or more anneals may be necessary. Because of its greater ductility, the 18-8 grade requires less annealing when spinning deformations are severe. Hence, this alloy is preferable to the AA or S-1[3] grades for spinning. Because of its tendency to harden when cold worked, the 18-8 grade requires considerable power to spin and is likely to wrinkle along the edges. This can be overcome by flanging approximately one inch away from the edge of the blank before working the center metal. The burr should be removed and edges turned smooth before starting.

Cast iron tools have been found to be quite successful in spinning the 18-8 grade. A nickel-chromium cast iron, heat treated to maximum hardness, is superior to straight cast iron for this purpose. The analysis should be approximately as follows: C, 3.00; Ni, 2.50 to 3.00; Cr, 0.75 to 1.00; and Si, 1.20 to 1.50 per cent.

Roller type tools are advantageous over the regular type, but compound tools are necessary on heavier gages

Soap of the yellow or naphtha type as used for regular steel spinning has been found to work equally well in spinning stainless steels. Some operators apply a heavy polishing tallow in conjunction with the soap.

As previously stated, the toughness and higher hardness of stainless steels make them resistant to flow. This applies to spinning the same as in deep drawing. Extra effort and heavier and more sturdy equipment are required in working these types of metals. It is essential to retard the spindle speeds to approximately one-half that used for regular steels.

Trimming the edges can be accomplished with greater ease by using a rotary type cutter. In case this type equipment is not available and a cutting tool must be used, a stellite or similar analysis tool steel will prove very satisfactory. Retarded speed on trimming is very essential due to the tendency of the metal to work-harden.

If edges are to be wired, use a wire of the same analysis as the material from which the part is spun. Should steel wire be used it is suggested that a solder seal be used under the bead to prevent precipitation of iron oxide from the wire.

The use of the 18-8 FS[4] grade for parts to be produced by spinning has enabled the operator to flow the metal with less resistance, with fewer anneals and in some cases without annealing.

Since the spinning operation will destroy any surface finish, No. 1 fin-

[3] Enduro S-1 analyzes 12.5 to 15 per cent Cr and 0.12 max. carbon, and has moderate corrosion resistance combined with high strength and toughness.

[4] Enduro 18-8 FS has higher nickel (11 to 12 Ni) than 18-8, and does not work harden as fast as 18-8.

THE completed spun part is here shown removed from the form.

ish material should be used for all spun parts. Furthermore, a polished finish such as No. 4 finish will not retain the lubrication as well as No. 1 finish.

Note: Do not bead over the edges unless the surface oxide or scale has been removed either by pickling or mechanical cleaning with an abrasive cloth or wheel.

Riveting

All rivet stock must be manufactured with greatest care and thoroughly inspected. Only smooth, centerless ground or cold drawn stock should be used. Any scratches, seams or flaws are most objectionable, being liable to open up in upsetting operations which necessitates rejection. To facilitate inspection, it is suggested that all rivet stock, particularly larger sizes, be given a white pickle as a final operation.

Rivet stock should be so heat treated as to produce a fine grain structure with maximum toughness and impact strength. It should be capable of being bent cold 180 deg. around a mandrel equal to its own diameter without cracking on the outside of the bent portion. An upsetting test is also desirable. This provides that a full sized specimen of bar withstand upsetting from a length of 1½ in. diameters to ½ in. diameter without cracking or splitting when heated to driving temperature.

Rivets in small sizes—up to ¼ in. to ⅜ in. diameter—may be, and preferably are, manufactured and driven cold. Larger sizes must be manufactured and driven hot. Annealing of rivets after manufacture, whether for hot or cold driving, is not necessary. All rivets for hot driving should be provided with cone heads, while rivets for cold driving should have the usual button heads. All rivets ½ in. in diameter and larger should have a 1/16 in. radius fillet under the manufactured head. Rivet holes in plates may be drilled or punched. If the latter, the hole should be reamed to remove strained or distorted metal. All holes in plates ½ in. or thicker should be chamfered or countersunk to insure rounded corners under the finished rivet heads.

All rivets must be carefully heated to the proper driving temperature as determined by the analysis. Rivets must be heated in a muffle type furnace equipped with pyrometers in good working order. Rivets must not be held at temperatures in the furnace longer than 30 min. for the straight-chromium series of alloys, or longer than 10 min. for the chromium-nickel austenitic series. Rivets which have been overheated or held too long should be discarded.

Hardenable Analyses

Type S-1 series.[3] Small rivets up to ½ in. to ⅝ in. diameter may be headed and upset cold, using hydraulic riveters. Larger rivets are upset and headed hot, but must at no time be heated above 1350-1400 deg. F. As all such steels are air hardening, heating to a high temperature will tend to produce brittleness and hardening and must be rigorously avoided.

Non-Hardenable Analyses

Types AA[2] and HC[5]. Again small rivets up to ½ in. to ⅝ in. in diameter may be headed or upset cold; larger rivets, hot. For type AA, rivet heating temperature must not exceed 1400 to 1450 deg. F. For Type HC, 1500 deg. should be the upper limit. Straight-chromium alloys of this type are very subject to grain growth at high temperatures and this must be strictly avoided, otherwise toughness and ductility will be greatly reduced and rivets will be unsafe.

Austenitic Alloys

Types 18-8,[1] 18-8-B,[6] HCN,[7] NC-3,[8] etc. As alloys of this type harden on driving at elevated temperatures much more rapidly than plain steel, precautions against this occurrence must be carefully observed by proper heating, otherwise rivets cannot be properly upset or driven. Small rivets, up to ¼ in. to ⅜ in. in diameter, may be headed and upset cold. Larger rivets should be driven hot, very hot, so that the rivet will be completely finished before it has cooled sufficiently to become hard. Rivet heating tempera-

[5] Enduro HC analyzes 25 to 30 per cent Cr and 0.25 max. carbon, and is designed for oxidation resistance to 2100 deg. F. rather than strength or toughness.

[6] Enduro 18-8 B has higher silicon (2 to 3 Si) than 18-8, to improve heat resistance.

[7] Enduro HCN analyzes 22 to 25 per cent Cr, 10 to 13 Ni and 0.20 max. carbon. Has oxidation resistance up to 2100 deg. F. and physical properties above 18-8S, the latter analyzing 0.08 max. C, 17 to 19 Cr, and 7 to 9 Ni.

[8] Enduro NC-3 analyzes 23 to 27 Cr, 17 to 21 Ni and 0.20 max C. Has high strength and oxidation resistance at high temperatures.

tures for these alloys should be 2100 deg. F.

Protecting the Surface

In polishing stainless steel to a No. 4 finish, No. 6 Tampico finish, No. 7 finish and No. 8 mirror finish, extreme care is exercised at the mill to obtain a flawless surface—free from pits, scratches and other defects. For certain applications of polished sheets, no fabrication is necessary. In such cases, only careful handling is required to preserve the lustrous finish.

Many applications of polished sheets —such as restaurant and cafeteria equipment, hospital and kitchen equipment, dairy equipment, meat packing equipment, soda fountains and many architectural uses—require brake or press work followed by welding or soldering and necessary grinding and polishing at welds. It is highly essential that precautions be taken to eliminate the possibility of scratches, dents and other marks on the polished surface.

It is quite difficult to match by hand, on a formed object, the finish that was obtained on polishing machines at the mill. Hence, it is to the advantage of the fabricator to protect the polished surface before any work is begun rather than to be faced with the job of polishing out marks that may have appeared through improper protection in forming equipment.

While it is not maintained that it is possible entirely to prevent scratching and galling on all types of work, the fabricator will save trouble, time and money by exercising every precaution against damage to a polished surface.

Protection Methods

Several methods of lubrication are being used. It is suggested that the fabricator select the method which best adapts itself to his particular operations.

The first consideration should be given to the condition of the dies. They should be well polished and at the first sign of any pickup of the metal, the press or brake should be stopped and the dies stoned and polished.

A satisfactory method for preserving the polished finish of the metal is the application of adhesive tape to the dies. This method can be used where the work applied to the metal is not severe, such as in bends on hand brakes. Its use is not recommended for deep drawing. The merit of this type of protection can easily be realized, as it prevents direct contact between the polished surface of the Enduro sheet and the hardened steel of the dies.

Following this same line of thought, the use of thin paper between the polished metal and the die is working well in some cases. Wax paper, oiled paper, cellophane and in some cases ordinary newspaper have been used with marked success in the elimination of die scratches. The paper is usually used as an adjunct to the lubricant.

Another method of protecting the surface of polished sheets both in shipping and handling in customer's plant is to apply ordinary wallpaper with wheat paste—allowing about 12 hr. to dry. Also adhesive paper and tape up to 36 in. in width are obtainable from several sources.

If soldering or welding is necessary after the sections have been formed into various shapes, the protective paper may be removed with hot water at the point at which the parts are to be joined.

Depending on the application, the protective paper in some cases is removed before shipping the parts to customer, in other cases the surfaces are permitted to remain covered, especially in building erection until ready to give the final cleaning for approval and acceptance.

The proper time for removal is, therefore, governed entirely by the application.

Protection During Building Construction

The wide use of polished stainless steel for exterior decorative purposes in building construction has made necessary the means of protecting it from what may be termed "building filth," meaning plaster, cement, concrete, ashes, rust from steel work and other contaminations with which the polished sheet may come in contact during the erection of a building.

Several of the large paint concerns have developed special lacquers which will protect the sheet for a period of one year or longer from the effects of "building filth." The lacquer can be removed at the completion of the building, or it may be allowed to wear off from the effects of the weather.

The need of passivation has not been stressed in this discussion. Its necessity should be thoroughly implanted in fabricators' minds. Whenever steel rolls, steel dies or shears come in contact with Enduro, there is a possibility of discoloration due to a film of iron being abraded on its surface. This film should be removed, either with the nitric acid passivation treatment or by buffing with approved stainless steel buffing compounds.

THE use of paper applied to the surface of the stainless steel as a protection during welding and grinding is shown here.

FIG. 1

THIS practically chromium-free iron contains considerable amounts of ferrite, and large flakes of graphite. The per cent chemical composition is: 3.42 C, 2.53 Si, 0.59 Mn, 0.14 P, 0.12 S, and 0.04 Cr. (X 100).

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FIG. 2

AN addition of only 0.45 per cent of chromium converts the ferrite of the base iron to pearlite. The size of the graphite flakes is reduced. (X 100).

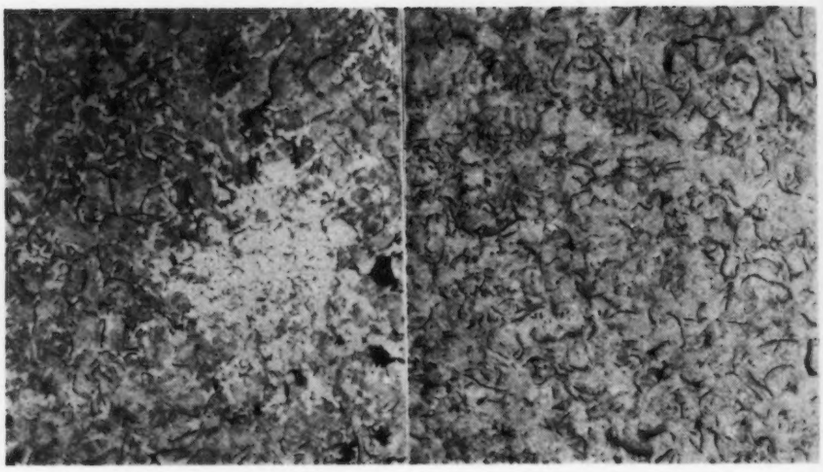


Fig. 1 Fig. 2

Beneficial Effects of Chromium and

SUPERIOR physical properties and excellent uniformity in castings of varying sections are obtained in low-chromium cast iron made so that part of the silicon content is added in the ladle. This iron is essentially free from "dendritic" or "eutectic" ferrite-graphite structures, the presence of which would be undesirable—especially in castings intended for applications requiring satisfactory resistance to wear.

The ferrite of such formations is eliminated by the chromium—which also stabilizes cementite, increases oxidation resistance, and performs other valuable functions. At the same time, a similar tendency toward formation of the objectionable "dendritic" graphite structure is prevented by the late addition of part of the silicon—which also encourages the development of normal flake graphite.

The chromium is added either to the cupola by means of ferrochrome briquets, or to the ladle by means of special foundry grade ferrochrome. The silicon addition to the ladle is best made as a ferroalloy containing 75 per cent or more silicon.

The evidence upon which these conclusions about the effects of chromium and silicon are based was obtained by adding the alloying elements to a base iron produced in a commercial foundry. Analysis of this base iron showed the following per cent composition: 3.42 total carbon, 2.55 silicon, 0.59 manganese, 0.14 phosphorus, and 0.12 sulphur.

Typical effects on the microstructure of this cast iron obtained by the presence of low-chromium additions are shown in Figs. 1, 2, 3, and 4.

The presence of 0.45 per cent chromium practically eliminates the free ferrite normally present in the unalloyed base iron (Fig. 1) and an almost completely pearlitic structure (Fig. 2) is developed. An increase to 0.77 per cent chromium (Fig. 3) produces some further pearlitic refinement, but no appreciable amounts of free cementite. This is in accordance with observations that, after establishment of a pearlitic structure by a minimum chromium addition, a considerable tolerance for additional chromium exists before the appearance of free cementite. When 1.19 per cent chromium (Fig. 4) is present in the base iron, some free cementite is observable. The cementite is frequently associated with and accents the phosphide eutectic areas. The amount of cementite is, in this case, still not sufficient to interfere seriously with machining.

The physical properties of cast iron with compositions similar to those in the first four illustrations may be expected to be approximately as shown in Table I.

Step-bars cast from this commercial base iron showed no chill in sections down to ⅛ in. with a 0.45 per cent chromium content: and with 0.77 per cent chromium the iron was

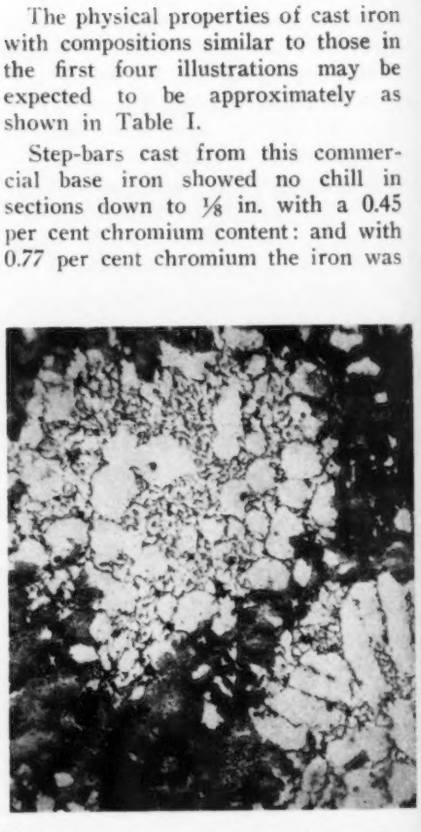


FIG. 5—A plain cast iron containing undesirable "dendritic" or "eutectic" ferrite-graphite structures. Per cent composition: 3.22 C, 1.95 Si, 0.03 Cr, 0.62 Mn, 0.174 P, 0.010 S, and 0.03 Ni. (X 250).

* Among others see: "Ferrite—Its Occurrence and Control," by R. H. Bancroft and A. H. Dierker, trans. American Foundrymen's Association, 1937, pp. 449-466. "Late Silicon Additions to Cast Iron," V. A. Crosley and A. J. Herzig, *The Foundry*, Vol. 66, No. 1, (Jan., 1938), pp. 28, 29 and 73.

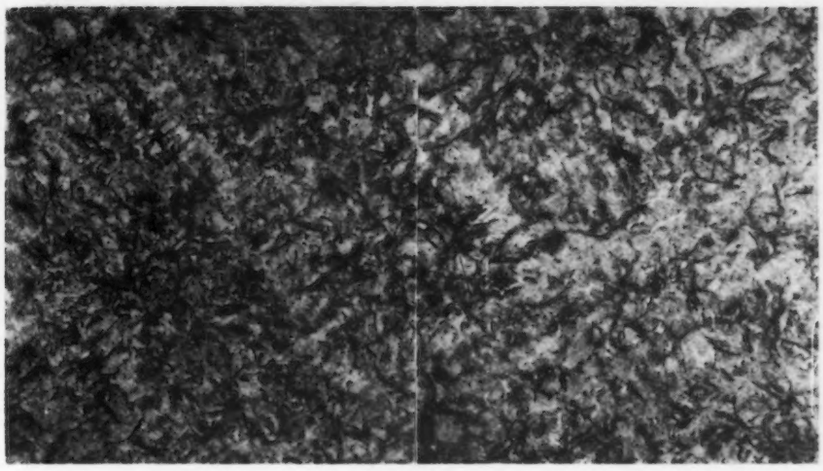


Fig. 3 Fig. 4

FIG. 3

WITH an increase in the percentage of chromium from 0.45 to 0.77, the pearlite is still further refined. Free cementite is still essentially absent. (X 100).

o o o

FIG. 4

WHEN 1.19 per cent of chromium has been added to the base metal, some cementite (associated with phosphide) is observable. The metal, however, is still machinable. (X 100).

Silicon Additions to Cast Iron . . .

gray in a ¼-in. section. With 1.19 per cent chromium content, a 1-in. section was gray and a ½-in. section predominantly gray. These results are important evidence that a foundry employing a base iron of a relatively common type can materially improve the physical properties and, of course, the heat endurance of this iron, by a simple ladle addition of ferrochromium.

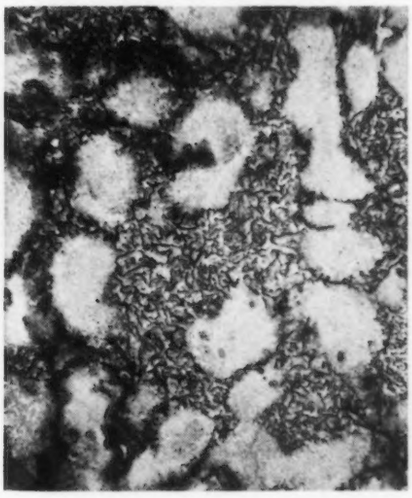


FIG. 6—Although the structure of this alloyed cast iron still contains some "dendritic" graphite, a chromium addition has converted the "dendritic" ferrite to pearlite, and has thereby improved the wear-resistance of the cast iron. Per cent composition: 3.27 C, 2.44 Si, 0.52 Cr, 0.80 Mn, 0.175 P, 0.096 S, and 0.23 Ni. (X 250).

Probably one of the most important effects of chromium is that of improving the wear resistance of cast iron by eliminating the deleterious effects of the previously mentioned "dendritic" or "eutectic" graphite-ferrite areas. These occur with great frequency even in supposedly pearlitic cast iron, and particularly in irons made with appreciable amounts of steel. As these areas, when present, are most plentiful near the surface of the casting, they almost invariably act as starting points for wear in castings such as lathe beds, cylinders, and piston rings. This phenomenon has been discussed extensively in recent papers*. The tendency of chromium additions to prevent ferrite formations in such areas can very readily be observed on metallographic examination.

Figs. 5 and 6 are micrographs of 1¼-in. square sections of two irons used for casting lathe parts. The analyses of the irons are shown in Table II.

Although both irons show areas of fine "dendritic" or "eutectic" graphite, the chromium addition to iron No. 6 has largely eliminated the ferrite that normally occurs in conjunction with "eutectic" graphite in an iron such as No. 5 not treated with chromium. Since investigations have shown that eutectic graphite is much less subject to "pitting out" when it is embedded in the harder, more rigid pearlitic matrix (rather than in ferrite), the wear resistance of the iron is definitely increased.

The various effects of alloying elements in cast iron are, of course, influenced by the presence of silicon, and, it might be added, by the manner in which the silicon is added. Although the effect of varying the amount of silicon contained in the cupola charge is well known, the marked change in the character of cast iron resulting from melting a charge containing 0.5 to 1.5 per cent less than the desired final silicon content and adding the balance of the silicon to the ladle has not yet received the wide attention that is merited. However, some information as to the improvement in physical properties resulting from such a procedure has recently become available.

The marked change is microstructure occurring when this method of silicon addition is used is illustrated in Figs. 7, 8, 9, and 10. Fig. 7 shows the structure of 0.50 per cent chromium iron that did not receive a ladle addition of silicon, while Fig. 8 shows the structure of an iron that is similar in composition, but the silicon addition of which was made partly in the ladle. The effect of such additions on the physical properties is also shown in Table III.

From the micrographs of Figs. 7,

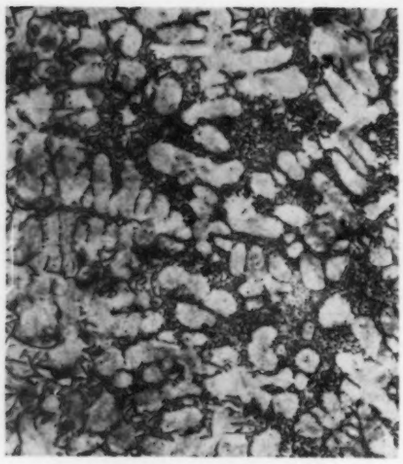


FIG. 7—This 0.5 per cent chromium cast iron has been made without the addition of any of the silicon to the ladle. The matrix is mostly pearlitic, but the graphite structure could be improved. (X 100).

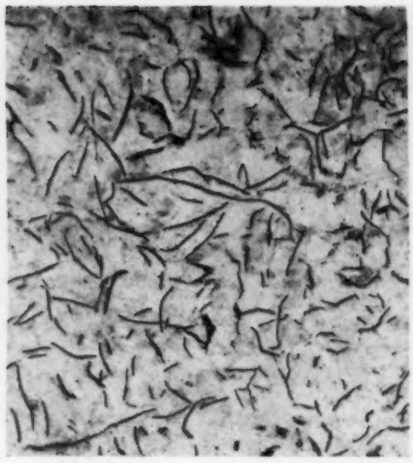


FIG. 8—This 0.5 per cent chromium cast iron has received part of its silicon addition in the ladle and has an excellent structure assuring splendid physical properties. (X 100).

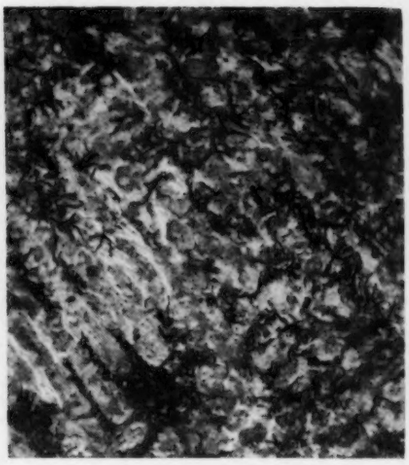


FIG. 9—The 1 per cent chromium cast iron shown here did not receive any of its silicon addition in the ladle. (X 100).

8, 9, and 10, it is clear that the addition of silicon in the ladle results in the suppression of localized "dendritic" or "eutectic" graphite areas and produces an even distribution of normal flake graphite. An improvement in mechanical properties results. A most striking but little recognized feature of such treatment is that it confers considerable immunity to wall sensitivity—that is, there is less tendency for castings to increase in hardness in places where their sections are reduced.

Tests with step-bars confirmed this. For example, the 0.5 per cent chromium iron (No. 7), whose silicon was added in the cupola, possesses a hardness of 430 Brinell in ¼-in. sections, which is nearly 200 points harder than in 1-in. sections. Contrast this with iron No. 8, which is of similar composition but has some ladle-added silicon. This has a hardness of only 250 Brinell in ¼-in. sections, and has essentially the same hardness in 1-in. sections. Likewise, the 1 per cent chromium iron (No. 9), which was made without ladle-added silicon, shows a hardness of 450 Brinell in ¼-in. sections; whereas No. 10 iron, which is of similar analysis and contains ladle-added silicon, has a hardness of only 320 Brinell in ¼-in. sections, and is relatively uniform throughout. A similar effect has been noted with intermediate amounts of silicon added in the manner described.

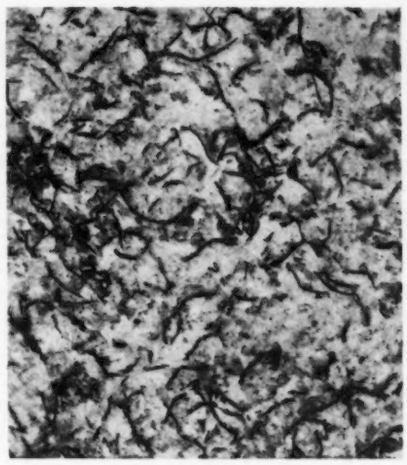


FIG. 10—This 1 per cent chromium cast iron received part of its silicon addition in the ladle. As a result it has an improved graphite structure. Despite traces of martensite, it is machinable. (X 100).

TABLE I

Effect of Chromium Additions on the Physical Properties of Commercial Cast Iron *

Iron No.	Chromium, Per Cent	Transverse Properties (12-in. Span) Strength, Lb.	Deflection, In.	Tensile Strength, Lb. Per Sq. In.	Compressive Strength, Lb. Per Sq. In.	Brinell Hardness
1	0.04	2100	0.273	27,000	94,300	163
2	0.45	2675	0.280	33,800	122,200	207
3	0.77	2550	0.278	35,600	117,100	207
4	1.19	2350	0.263	36,100	121,200	235

* Analysis of base iron, in per cent: 3.42 total carbon, 2.55 silicon, 0.59 manganese, 0.14 phosphorus, and 0.12 sulphur.

TABLE II

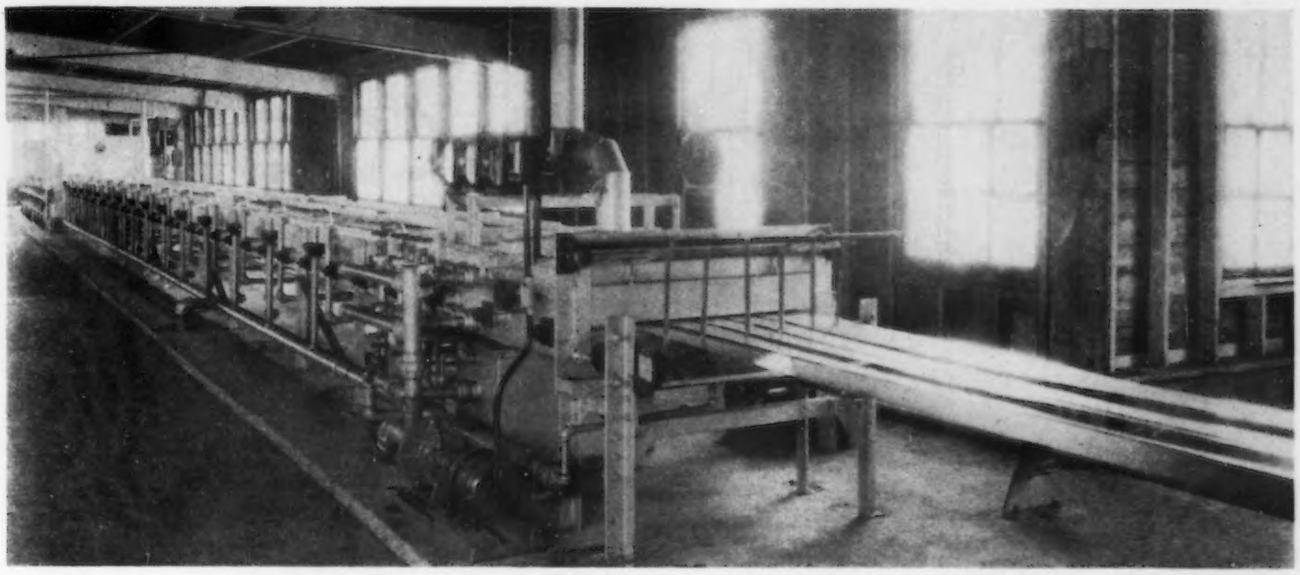
Composition of Cast Iron Used for Casting Lathe Parts

Iron No.	Total Carbon, Per Cent	Silicon, Per Cent	Chromium, Per Cent	Manganese, Per Cent	Phosphorus, Per Cent	Sulphur, Per Cent	Nickel, Per Cent
5	3.22	1.95	0.03	0.62	0.174	0.10	0.03
6	3.27	2.44	0.52	0.80	0.175	0.096	0.23

TABLE III

Effect of Adding Part of the Silicon Content of Cast Iron to the Ladle Instead of to the Cupola Charge

Iron No.	Silicon as Ladle Addition, Per Cent	Final Analysis, Per Cent C	Cr	Fi	Mn	P	S	Transverse Properties (12-in. Span) Strength, Lb.	Deflection, Per Cent	Tensile Strength, Lb. Per Sq. In.
7	None	3.01	3.51	2.41	0.54	0.03	0.10	3300	0.102	36,800
8	1.40	2.99	0.53	2.59	...	...	...	4200	0.150	45,500
9	None	3.08	1.03	2.59	...	...	...	4250	0.120	44,100
10	1.40	2.95	1.10	2.59	...	...	...	4325	0.125	46,700



ANNEALING COLD ROLLED STRIP

AN improved strip annealing installation is now in use in the plant of a major cold rolled strip manufacturer. This equipment, made by the Electric Furnace Co., Salem, Ohio, consists of an electrical heating chamber, a relatively long continuous cooling chamber, and a spray cooling section adjacent to the discharge end. Reeling and unreeling equipment is provided at the ends of the furnace installation to faciliate handling of the coils of stock. Designed for continuous parallel strands of strip 6 in. wide, the equipment may be used for a single strip up to 30 in. in width, and any number of narrower parallel strips within the clearance dimensions of 30 in.

In operation, strip is continuously passed from the unreeling apparatus through an entrance vestibule at the charging end of the furnace chamber, where it comes in contact with and is conveyed through the atmosphere filled heating and cooling chambers by a roller hearth conveyor whose individual rolls are spaced on approximately 2-ft. centers. After a relatively short time in the heating chamber, the continuous strips pass through a water coil type cooling chamber in which the temperature of the material gradually and uniformly is lowered throughout the section of the stock until such time as the strip passes into a short spray chamber adjacent to the discharge end of the cooling hood. The stock is here sprayed with water at a temperature of approximately 190 deg., and is thus quickly cooled to a temperature of approximately 200 deg. F., which is sufficiently low to insure no discoloration upon the passing of the work into the outer air, but allows sufficient residual heat to be retained within the stock to insure the strip being dry and bright as it emerges from the furnace equipment, as shown in the accompanying photograph.

Clean, scale-free work is made possible by designing the furnace equipment to be substantially gas-tight and then purging of air by means of the non-oxidizing products of combustion formed in a gas cracker or generator.

A motor drive and variable speed reduction are so arranged as to quickly and easily provide the proper time and speed through the heating chamber for each type and thickness of strip normalized.

Although ordinarily used at temperatures of approximately 1750 deg. F., the temperature within the furnace chamber may be varied according to the normalizing procedure most suitable to the requirements of the various types of strip. Temperatures as high as 2000 deg. F. are possible. Temperature control in the heating chamber is accomplished by means of thermocouples and pyrometers in three distinct zones, the electrical heating elements in each zone being connected or disconnected from the power supply through relays and switching equipment according to the control of the respective pyrometers.

The equipment shown is rated at 275 kw. and has been designed for the continuous bright production of 2000 lb. per hr. of steel strip heated to 1750 deg. F.

. . . UNIT COOLING

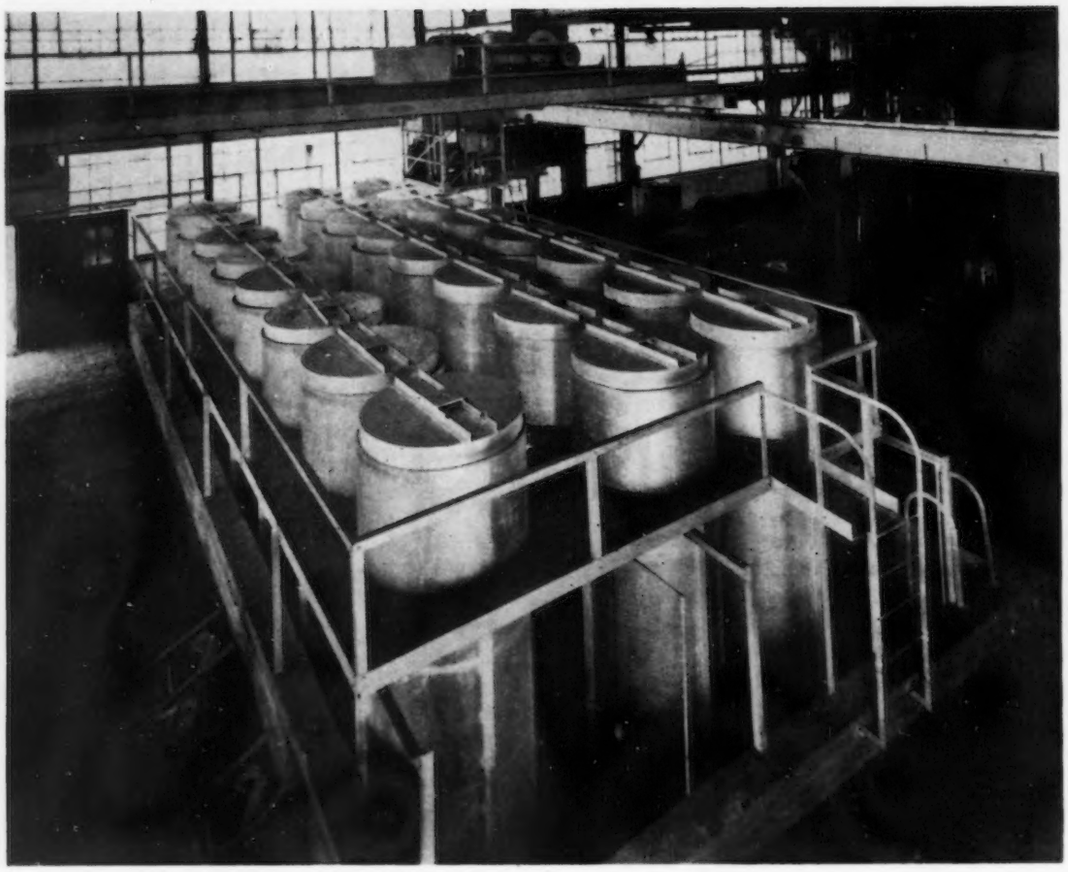


FIG. 1—Typical installation of low heat capacity pits for cooling chilled cast iron car wheels.

REGULATION of the chill on wearing surfaces and the elimination of all initial shrinkage strains are two important phases of the production of chilled iron car wheels.

The depth of the chill is a visual and known quantity and its regulation is not difficult with present knowledge of the subject. The elimination of shrinkage strains, however, is a more difficult problem as these strains cannot be seen either before or after breaking the wheel.

Car wheel makers know that to prevent the formation of these internal stresses, slow and uniform cooling is necessary. To obtain this gradual reduction of temperature cooling pits of various design have been used. The most common types are the sand-filled group pit, the high heat capacity checkerwork pit and the low heat capacity pit. This latter type has been found to be generally the most satisfactory type.

Close Regulation Vital

Pits used for the cooling of car wheels must hold the wheels above the critical temperature, 1300 to 1350 deg. F., for a period sufficient to allow the tread and hub to equalize in temperature. About six hours is the average time required. The rate of cooling must not exceed 10 deg. per hr. through the critical range; the wheels must cool to below 1200 deg. F. in 20 hr., and the cooling must be uniform from top to bottom. For best results the pit must be easily regulated, with no possibility of either over-annealing or under-annealing the wheels, and must be able to meet these conditions under one-day, two-day and intermittent operating schedules. A further, and important, requirement is economy with respect to initial construction, maintenance, fuel, labor and supervision.

Ideal Type Sought

In an investigation to determine the ideal type of cooling pit, the Association of Manufacturers of Chilled Car Wheels eliminated from its consideration the sand filled group type for the following reasons: (1) The heat loss is largely confined to the top of the pits, hence cooling is too rapid at the top and too slow at the bottom; (2) for intermittent operation large quan-

PITS . . .

A Description of Low Heat Capacity Unit Pits for Cooling Chilled Car Wheels

o o o

By ROBERT BINGHAM
Western Editor

o o o

tities of fuel oil are necessary for maintaining the proper temperature for receiving the hot wheels; (3) the temperature from top to bottom, and for different positions in the group, varies through a considerable range.

The type having checkerwork between the wheels, while a decided improvement over the sand filled types, requires close personal attention when operated intermittently, and also requires a transfer to cooler pits after 24 hours. This type of pit represents an intermediate stage between the sand filled group pit and the third type known as the low heat capacity unit pit.

"From the standpoint of theoretical calculations," the association has stated, "the principal of a pit having low heat capacity and high resistance to heat transmission apparently satisfies all the conditions previously set forth as representing the requirements of an ideal pit for the cooling of car wheels."

Cooling Curves Identical

In a battery of 20 or 40 unit cooling pits, each pit is an individual unit, having no mechanical or thermal connection with the other pits and is independent of personal attention after it is loaded and the cover sealed. The cooling curve of each pit is exactly like that of every other pit.

To obtain a satisfactory cooling rate, pits of this type rely on a definite resistance to heat tranfer through the walls for a predetermined differential in temperature. It is the only pit of the three types previously mentioned not requiring additional firing for a satisfactory cooling curve.

Has Vertical Pipe Guides

The pits preferably have a capacity of 22 wheels. Boiler plate 3/16 in. thick forms the outer shell of the pit. The interior of the shell is hung with three 1½ in. wrought iron vertical pipe guides which direct the wheels into position as they are lowered into the pit, protecting the insulation from abrasion. The method employed in suspending these guides eliminates buckling.

The shell is 54 in. in diameter and is lined with 6 in. insulating blocks. The base consists of insulating brick, built up 15 in. from the bottom for more efficient insulating and to provide adequate strength for supporting the load. The cover is lined with a 12-in. layer of insulating material.

Cooling Procedure

The wheels are placed in the pits from the shakeout at about 1500 deg. F., approximately 100 deg. being lost by the transfer. The tread, which is around 1200 deg. because of the chill, is equalized by the heat of the other parts of the wheels soon after being placed in the pit. After three days in the pit, during which time they lose about 10 deg. per hr., the wheels are taken to the hot beds for further cooling in air. The temperature of the wheels at this point is between 700 and 800 deg. F. Following this they are cleaned by sand blast, weighed, inspected and made ready for shipment.

This type pit has now been installed by many car wheel plants throughout the country.

Ed. Note: A more extensive discussion of the heat dissipation problems involved in this type of cooling pit may be found in the article "Controlled Heat Dissipation," by J. G. Coutant, published in THE IRON AGE, Oct. 13, 1938.

AUTOMATIC "SEWING" MACHINE

LARGE automatic welding machine "stitching" the wrapper plate to the rest of the stator frame of a big synchronous motor at the Schenectady works of the General Electric Co.

PULVERIZED COAL

By C. F. HERINGTON
Engineer, Amsler-Morton Co., Pittsburgh

IN the first half of this article, published in the Jan. 19, 1939 issue, the author reviewed the history of the use of pulverized coal in metallurgical furnaces and described various difficulties that worked against widespread adoption. Three types of equipment to handle and fire the pulverized coal have been mentioned, and the remainder of the article herein is devoted to a detailed description of the third and preferred system. The first detail of this system deals with the transport tank.

AFTER the coal is pulverized and delivered into the storage bin at the coal plant, it is transferred by means of compressed air operated gate and bell valves into a transport tank. This tank usually is placed on scales adjacent to the pulverized coal storage bin at the coal plant, which arrangement enables the operator to keep a record of the amount of coal transported to any particular furnace or group of furnaces having a common heating operation.

When the transport tank is filled with coal from the storage tank, the valves between the tank and the pulverized coal storage bin are closed, an air valve is then opened, and dry compressed air at reservoir pressure enters the tank.

The turbulence and pressure built up in the tank by the admission of air aerates the coal. When the desired pressure is attained, depending upon the distance the coal is to be conveyed, the initial air supply line is closed, the valve in the discharge pipe is opened and the mixture of coal and air moves to the sub-station storage bin located near the furnace.

Electrically operated switching valves are placed in the transport pipes so that the flow of coal from the transport tank to the sub-station bins will be under the control of the coal plant operators from their remote station.

A signal panel and transport tank switchboard panel are placed in the coal plant, both being actuated at predetermined levels by indicators placed in the various storage bins at the furnaces. The operator thus is able to determine when the coal in the bin must be replenished and when the correct quantity has been replaced. All this is accomplished by remote control.

The equipment at each sub-station bin, serving one furnace or a group of furnaces, consists of a twin-screw coal feeder—as shown in Fig. 2 (in the Jan. 19, 1939, issue)—with a mechanically operated agitator at the bottom of the bin, driven by means of a variable speed drive. This equipment delivers the coal into the discharge pipe of a primary air blower. Only sufficient air is used to convey the pulverized coal in suspension, through a steel pipe terminating at a burner in the furnace.

Secondary air is admitted at the burner, and the combustible mixture enters the furnace. In no case does the pulverized coal enter the inlet of the primary or secondary air blowers, and thus there is eliminated the abrasion of the coal dust on the fan blades. Furthermore, as the secondary air is not admitted to the mixture of primary air and coal dust prior to entering the burner, there is no danger of having a combustible mixture in the pipe line before entering the furnace. This and the other important features are essential to a well-balanced and safe system.

The correct amount of secondary air admitted to the burners for combustion should be controlled independently of the primary or conveying air in order to obtain efficient furnace control. In order to automatically control furnace pressure and temperature, it is as necessary to control the amount of secondary air for proper combustion, as it is to control the amount of coal fed from the feeder into the primary air.

Feeder Has Positive Action

The twin-screw pulverized coal feeder provides a non-flushing and positive type unit. It consists of two forged steel screws running in a cast iron trough and is equipped with a mechanically operated agitator which prevents the coal from arching over the screws. A brass plate cut-off gate is inserted between the agitator casting and the feeder. Each feeder is equipped with a variable speed drive and remotely controlled by the operator or heater at each furnace.

These twin screw feeders have proved reliable in various plants throughout the country. There are feeders in operation today that were installed on storage bins in 1924 and 1927 and have not been removed for repairs since they were installed. Their accuracy has been established as being within one-half of one per cent correct at normal operating speeds.

When the rotary coal dryer, formerly in general use as a means for drying before pulverization, is eliminated from the preparation of the coal in a central plant, the coal must be dried during pulverizing by installing a hot air heater of some kind, either steam, gas or oil fired. These air heaters require but little space in the plant, and are very efficient. The heaters are attached to the pulverizer air intake and the hot air at temperatures ranging from 200 to 300 deg. F. flows into the base of the mill, then

passes into the annular space and mixes with the air which is carrying the fine coal out of the mill into the cyclone collector or separator.

Dampers are arranged so as to admit the correct amount of hot air to the pulverizer, depending upon the amount of moisture in the coal being fed into the pulverizer. Also, since by drawing additional hot air into a closed circulating system, as in the normal operation of the pulverizer, provision must be made to equalize or remove a proper amount of air from the closed circulating system. This is accomplished by using a vent fan for exhausting an amount (controlled by a damper) of air from the return air line between the cyclone collector and the pulverizer. This return air contains the excess steam or moisture laden air with fine pulverized coal. The mixture is discharged by the vent fan into twin concentrators, which separate the pulverized coal from the air, the air finally passing out into the atmosphere.

Usually the vent fan, under maximum conditions draws out the necessary volume at 120 deg. F. This is based upon the coal entering the pulverizer having a maximum moisture of five per cent and being reduced to one per cent. When the moisture is lower, the amount of heat entering the mill will be tempered to the point where the temperature either in the pulverizer air separator or the cyclone collector is about 125 deg. F. The correct temperatures can be established in operation and are easily controlled by dampers, automatically or manually.

Burner Design Simple

As previously mentioned, the best burner to use with pulverized coal is one that is the simplest in design, as shown in Fig. 5. Thousands of dollars were expended by the early equipment manufacturers to devise burners which would create and cause thorough mixing of the coal and air, and devise burners in which the air surrounds the coal as it enters the furnace. Such types of burners have not proved practical. One illustration will serve to indicate this fact.

A copper melting furnace of over 200-tons capacity was fitted with three burners designed to admit the secondary air in a circle enclosing the core or center of the pulverized coal mixture. As this mixture of coal and primary air entered the furnace chamber, the coal dust would fall into the lower half of the circle of secondary air, while the upper half of the circle of air would immediately rise away from the stream of coal. There was thus required an excess of secondary air in order to obtain complete combustion.

In another copper plant using a furnace of the same capacity, the writer in order to overcome this condition used as a burner a circular pipe flattened at the end having an opening of 1¾ x 14 in. wide. Directly below the burner the secondary air was admitted through an opening 6 x 14 in. wide.

With one burner of this type a ratio of 180 lb. of coal per ton of copper was obtained, whereas with three circular burners in a row, the ratio secured was 250 lb. of coal per ton of copper, besides the oxidation. Also, the velocity of the coal stream was increased with the flat burner, so that very little ash was deposited on the copper bath.

Control is Automatic

The important factors in metallurgical furnace operation are control of pressure, temperature and combustion. Since such controls have admittedly been accomplished in the use of pulverized coal in its application to boiler firing, there is no reason why similar controls cannot be applied to applications of this type of fuel to metallurgical furnaces.

The present day trend is actively in the direction of automatic control of such furnace factors. For this reason an entirely new design has

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FIG. 4—Automatic control system designed for a slug heating furnace.

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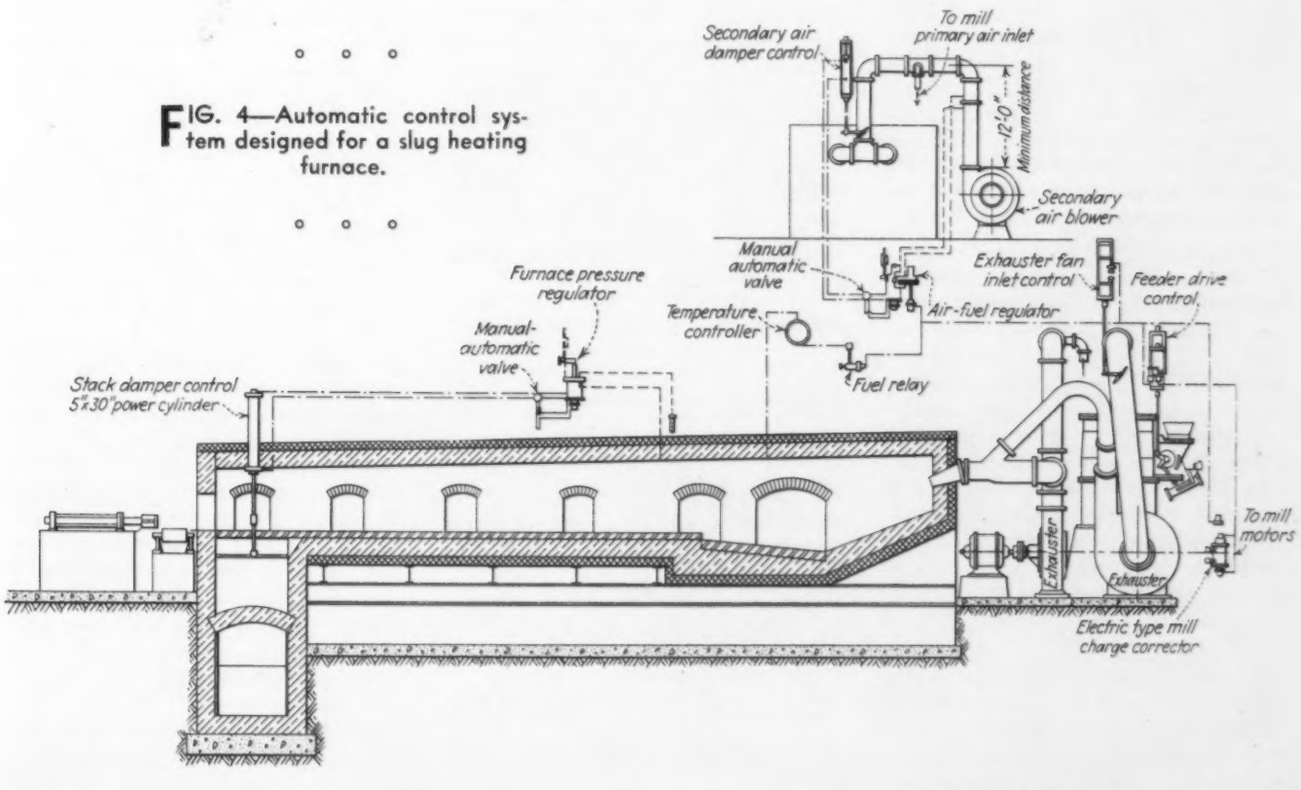

been created which permits complete automatic control of internal pressure, heating temperatures and rates of combustion.

Fig. 4 shows an automatic control system designed for a slug heating furnace. The operation is as follows:

The system incorporates automatic control of fuel input in order to maintain a constant temperature within the furnace. The system also includes automatic control of air flow to maintain a predetermined fuel-air ratio. There is also a furnace pressure regulator which operates to control the outlet slide damper in order to maintain a predetermined pressure within the furnace. In operation, the temperature controller, sensitive to the temperature within the furnace, generates a pneumatic impulse in accordance with deviations in this temperature due to variations in heating rate, and this impulse in turn passes to the fuel relay which provides a means of adjustment of both air and coal from a central point when on manual control. On automatic control, this device merely relays the impulse to the coal and air control apparatus.

The fuel control apparatus consists of an exhauster fan control inlet damper control, a feeder drive control and an electric type charge corrector. The feeder drive control which regulates the inlet of coal to the pulverizer shown is a dual type unit, and is arranged to receive the impulse generated by the mill charge corrector. The primary control of coal feed is received from the temperature controller and any slight re-adjustments necessary to compensate for variations in coal size or moisture in the coal are received from the mill charge corrector.

The mill charge corrector is a device responsive to the power demands of the pulverizer driving motor. Tests indicate that with this particular type of pulverizer the power demands of the mill driving motor is an excellent measure of the coal level within the mill. The master impulse operating the coal feed apparatus also operates the exhauster fan inlet damper to set up the desired relationship between coal feed and primary air. For control of the secondary air flow, the master impulse is transmitted to an air fuel ratio regulator, which operates a secondary air damper control, to regulate the secondary air flow to the furnace in such a manner that the pressure drop across a measuring orifice in the secondary air line is balanced against this master air loading.

The air-fuel ratio regulator incorporates means for setting the air-fuel ratio at the desired value.

The furnace pressure regulator consists essentially of a diaphragm loading balanced by a spring, the tension of which is adjustable from the panel. Deviations in pressure from that necessary to balance the spring loading result in oil impulses being transmitted to the stack damper control power cylinder, which will move in the direction and in the necessary amount to maintain constant pressure within the furnace.

TABLE 1

Comparison of Fuel Oil and Pulverized Coal in Copper Bar Furnace

	Fuel Oil	Pulverized Coal
Length of test run	100 days	94 days
Furnace out	21 days	18 days
Tons of copper poured	25,500	23,840
Per cent slag	1.67	2.32
Gallons of fuel oil per ton	22.58	
Pounds of coal per ton		200
Cost of fuel oil per barrel	$1.80	
Cost of coal per ton		$4.43
Maintenance of oil system, per ton	$0.457	
Maintenance of coal system, per ton		$0.0785
Cost of slag treatment per ton	$0.1677	$0.2326
Cost of oil, per ton copper	$0.9678	
Cost of coal, per ton copper		$0.4898
Total Costs per Ton	$1.1812	$0.8009

Operating Data

In an installation of pulverized coal on a copper wire bar furnace, the following comparison was made between the use of fuel oil and pulverized coal: The amount saved by the use of pulverized coal over that of fuel oil was 38.03c. per ton of copper, $4943.90 saved per month, and $59,326 saved per year. These savings were based on two furnaces pouring 13,000 tons per month, according to the following details shown in Table 1.

On a malleable iron air furnace used for melting pig iron, scrap and sprue, the substitution of pulverized coal for coal on grates has increased the tonnage of the furnace from 35 tons to 55 tons melted in the same time. The coal consumption was reduced from 900 lb. per ton of melt to 600 lb. per ton.

Using pulverized coal on malleable casting annealing ovens, there has been obtained a saving from 1000 lb. of coal per ton of castings annealed to 500 lb. per ton. In this case hand fired coal on a grate was replaced. In addition the shortening of the annealing cycle resulted because of an ability to bring up to soaking temperature more quickly. The coal pulverizing costs are as follows: Power, 12.314c.; maintenance, 8.914c.; labor, 33.68c.; and supplies and overhead, 11.37c. The total cost per ton of coal used is thus 66.27c. These figures are based on a central pulverized coal plant, where about 200 tons of coal is used each 24-hr. day; when the output is 300 tons per day, the cost per ton is decreased to 43c. In a Canadian installation pulverizing over

(CONCLUDED ON PAGE 84)

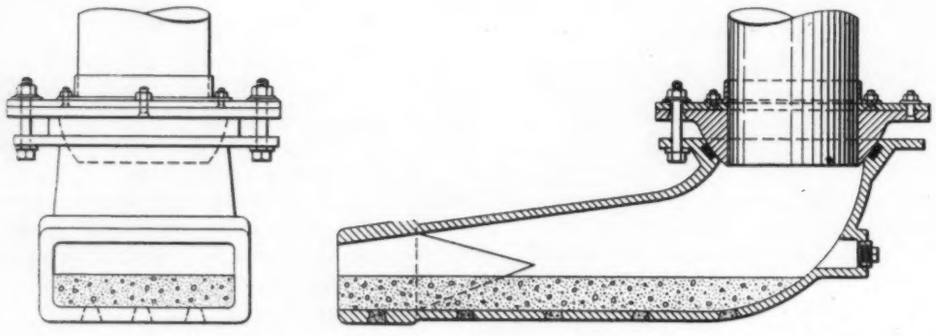

FIG. 5—Pulverized coal burner for metallurgical furnaces.

Further Design Advances in Motors, Controllers and Lighting Equipment

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By FRANK J. OLIVER
Associate Editor, The Iron Age

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ANOTHER line of explosion-proof motors has been brought out, featuring fan ventilation from both ends in the larger frame sizes, and in the fractional horsepower types, a split capacitor type has been introduced. The time to charge a condenser to a given potential is made the basis of a new acceleration control starter. Two new types of limit switches are described. In the high potential field, the latest development is a nitrogen filled cable with higher dielectric strength for a given space. New lighting designs include a high efficiency fluorescent tube lamp, vapor proof lamp guards and new styles of lighting panelboards for industrial plant use.

A NEW line of explosion-proof ball-bearing motors has been announced by *Fairbanks, Morse & Co.* These motors, approved by Underwriters' Laboratories for class I, group D hazardous locations, insure against accidental ignition or explosion of vapors or gases prevalent in plants producing or employing volatile oils or combustible gases.

These F-M motors are built in NEMA frame sizes. Double end ventilation is featured in the fan cooled type, used in frame sizes 224 and larger. Frames 204 and smaller have enclosed, non-ventilated construction. All frames have symmetrical proportions, resulting in same dimensions on pulley end as on free end. Cartridge type sealed ball bearings are used throughout the line. Unusual mechanical strength, generous electrical design, elimination of hot spots due to positive cooling, and wide positive seal, metal-to-metal fits are among the claims made for this type QZX motor line.

Geared Head Motors

FROM Los Angeles comes news of a new electrical geared head motor adaptable to all types of vertical shaft down drive, especially for agitators and mixing devices in various kinds of tanks. A product of *Sterling Electric Motors, Inc.*, type KFVHLB Slo-Speed vertical, double reduction motors are available in sizes from ⅛ to 30 hp. and with output speed from 18 to 900 r.p.m. A footless ring mount is regularly furnished. These motors have helical gear drives, mounted on ball bearings throughout.

Fractional Horsepower Line

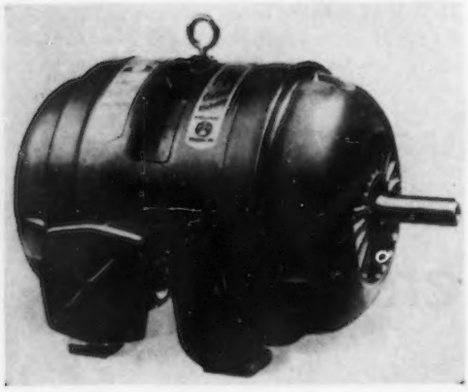
FOR applications that do not require excessive starting torque, the *Ohio Electric Mfg. Co.*, 5908 Maurice Avenue, Cleveland, is offering a permanent split capacitor motor in ratings from 1/150 to 1/20 hp. and speeds of 850, 1700 or 3400 r.p.m. This motor delivers a starting torque of 0.75 oz-ft., equal to 150 per cent of full load, and a maximum running torque of 2.5 oz.-ft. It is intended to compete with universal and shaded-pole motors for light power work. It can be built with solid or resilient base to operate horizontally for floor, wall or ceiling mount, or vertically, with shaft extension either up or down. Bearings are oil tight, diamond bored, and oil wells are of sufficient size to provide for 1000 hr. of continuous operation per oiling. It starts and operates at temperatures below freezing.

Motor Acceleration Controllers

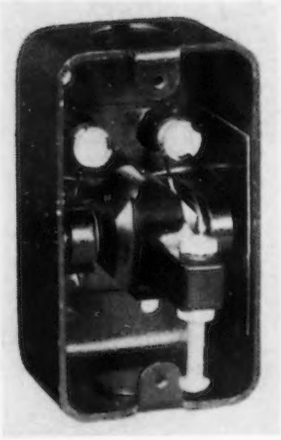
NO-TIME acceleration is being used in a new line of starters and controllers offered by the *Electric Controller & Mfg. Co.*, 2682 East 79th Street, Cleveland, for automatically controlling the acceleration of either a.c. or d.c. motors. The Neotime principle is based on the time required to charge a condenser to a predetermined voltage, the time being varied by an adjustable resistor in the charging circuit. When the selected voltage is reached, the condenser discharges through an industrial type

AT LEFT

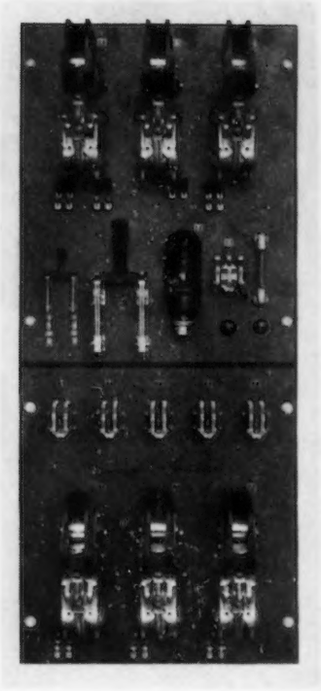
TYPICAL of the new line of type QZX F-M explosion-proof motors is this fan-cooled model, a feature found in NEMA frames 224 and larger.



THIS Ohio permanent split capacitor type motor is rated at 1/100 hp. at 1700 r.p.m. It measures 3¾ in. square by 4¼ in. long and is used to drive a hot water circulating pump in hot water heating systems, but can be used for many light power drives.

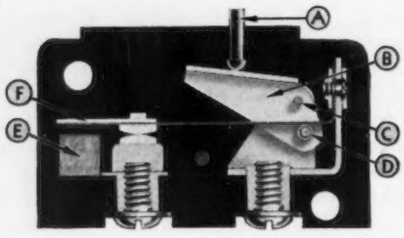


THE G-E mercury button limit switch employs a new principle of design and requires only minute force for actuation. Can be used only in a vertical mount as shown.



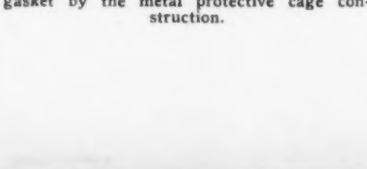
PICTURED is a 75-hp., 230-volt d.c. E. C. & M. Neo-Time acceleration starter. The electrostatic principle of control employed permits a range from 3 sec. per acceleration step up to over 30 sec. maximum per step by simply turning the adjusting dial. Corresponding total acceleration time is from 15 to 160 sec.

THE new G-E 100-watt fluorescent tube lamp for industrial applications has three times the efficiency of equivalent wattage incandescent light sources.



THE McDonnell & Miller snap switch is a compact, low operating pressure, short-travel type. The switch illustrated is a single-pole, normally closed type, but it is also made in normally opened types, single-pole, double-throw types and other variations.

THE new Bakelite encased a.c. clamp-ammeter, model 633, just announced by Weston Electrical Instrument Corp., Newark, N. J., will measure current flow through conductors up to 2¼ in. in diameter, carrying up to 660 volts potential. It combines six ranges, with full scale readings from 10 to 500 amp. Additional lower ranges may be secured by passing the conductor through the split core transformer (clamping jaws) two or more times. Positive closing of the magnetic circuit is provided by machined joints and sure action clamping jaws. The instrument used is the standard Weston model 301.

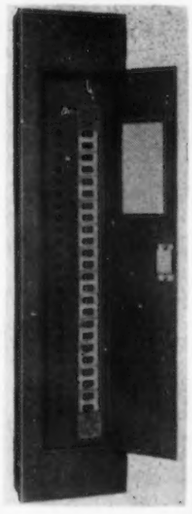


THE McGill No. 3005 vaporproof lamp guard encloses the lamp in a pyrex glass bowl held securely in an air-tight rubber gasket by the metal protective cage construction.

THE new Pyle-National Pylets include all standard types of threaded conduit fittings. The galvanized iron bodies are provided with a baked aluminum finish.

TWO new types of weatherproof transformers for use with high-intensity mercury lamps are offered by the Jefferson Electric Co., Bellwood, Ill. They are assembled in heavy one-piece copper-bearing steel cases filled with a high dielectric, waterproof compound of great heat conductivity. The illustrations show a pole-type transformer (left) with lamp fixture mounting support and a standard indoor type (right). All connections in the former may be made at the mast head adjacent to the mercury lamp, making the unit adaptable to old installations.

A NEW type of gas-filled high tension cable was described by G. B. Shanklin, engineer of the cable division of General Electric Co., before the American Institute of Electrical Engineers in New York last week. The general construction is similar to that of oil-filled cables except that the feed channels are filled with inert nitrogen under a moderate pressure of 10 to 15 lb. per sq.in. The three small channels which convey the gas and equalize the pressure are designed to leak so that the nitrogen is actually in direct contact with and saturating the impregnated paper insulation. The cable shown is rated 15 kv., 800,000 circular mills.



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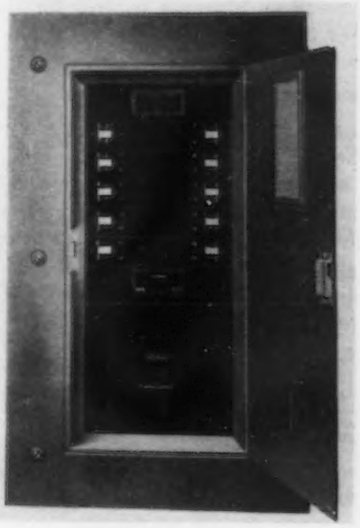
SQUARE D CO., of Detroit, has extended the Multibreaker to meet special lighting panel requirements of the industrial field. Type LX narrow panels are available in two sizes to fit into the recesses of either 8 or 10-in. H-beams. The circuit breakers are type M Multi-breakers and can be furnished in single and double pole branches up to 50-amp. capacity. These panels are furnished for either 3 or 4-wire a.c. service. The trim is hinged to the box and held closed with screws.

BELOW

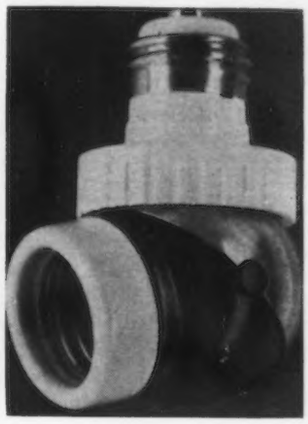
FOR use with the new Mazda projector and reflector lamps, the General Electric appliance and merchandise department, Bridgeport, has announced a new adjustable angle adapter. The device can be inserted in any existing outlet and it enables the lamps to be adjusted over a wide range of angles either for flood lighting or spot lighting. Vertically the adapter permits adjustments of as much as 70 deg., and horizontally the lamp can be swung around 340 deg.

AT RIGHT

SQUARE D type NMM Multibreaker panelboards are a moderately priced circuit breaker lighting panel for industrial plants. The unit is shown with main circuit breaker, but is also available with main lugs only. This type can be had with any number of single pole or double pole breakers in branches, except that any one panel is limited to 40 breaker poles.



TO provide local daylight illumination for inspection work, drafting and color matching, the Goodrich Electric Co., 2900 N. Oakley Avenue, Chicago, has designed a new type fluorescent fixture to accommodate 18 and 36-in. fluorescent lamps. The fixture is finished in three coats of white porcelain enamel inside. Because these lamps operate at much lower temperatures, closer mounting is possible than with incandescent lamp fixtures.



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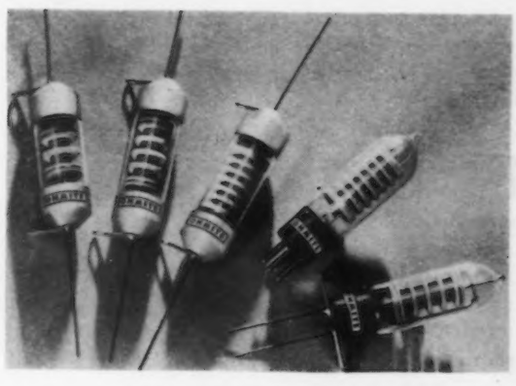
OHMITE MFG. CO., 4835 Flournay Street, Chicago, is now offering a line of hermetically sealed precision resistors for industrial and other uses under severe atmospheric conditions. The units are non-inductively pie-wound on porcelain in two, four, six or eight sections. Terminals emerge through vacuum type glass seals, and the resistors are provided either with soldering lugs or bakelite tube bases. Resistances range from 0.1 ohm to 2 megohms.



neon tube, causing the first acceleration contactor to close and re-energizing the timing circuit for the next cycle. This is continued until the motor is operating on full line voltage. Practically any range of time acceleration may be had, although the principal application is to drives requiring a long time for acceleration, such as shears with flywheels.

Another type of motor acceleration control made by *E. C. & M.* employs magnetic relays that operate from the frequency induced in the rotor circuit and hence automatically regulate acceleration to allow the motor to exert predetermined torque throughout the entire starting period. Application of this frequency relay magnetic control to crane hoists was described in a recent review of developments in material handling apparatus (THE IRON AGE, Dec. 1, 1938, p. 52). Mill applications of this simplified control, which broadens the use of a.c. wound rotor motors, include non-reversing control for shears and non-ferrous metal mill drives; non-reversing, quick stop by reverse torque control for wire drawing machinery; and reversing, plugging control for transfer cars and turntables, coke pushers and the like.

On wire drawing blocks a quick stop is usually desired to eliminate drifts and unnecessary unreeling of the wire. For this application, a frequency relay of the same type as used for acceleration, but designed to operate exactly at the zero speed frequency, is used to remove the reverse torque contactor at the instant the motor comes to rest.

For plugging applications, the responsive relay is used to control the plugging contactor when the motor is rapidly reversed from one direction to the other. The plugging relay prevents closure of the plugging contactor until the instant of reversal of the motor, at which time the plugging resistor is cut out of the circuit by this contactor and the motor is automatically accelerated in the reverse direction.

Limit Switches

FOR applications where the force required to operate a limit switch is small, *General Electric* is offering a single-pole type that uses a mercury-button contact mechanism for opening and closing the circuit. The mercury-button element consists of two hemispherical metal shells separated by a special ceramic disk with an off-center hole. The assembly is partially filled with mercury in a hydrogen atmosphere, and is hermetically sealed with a glass ring.

When the mercury button is rotated in the vertical plane, the off-center hole, normally below the surface of the mercury, is raised out of the mercury, thus opening the circuit between the metal shells. A positive, quick break is assured. The only force needed to throw the switch is that required to overcome the inertia of a light weight molded actuating lever.

COMBINED spring and magnetic action is used to give quick make or break with a wide air gap in a short-travel, low operating pressure snap switch offered by *McDonnell & Miller,* Wrigley Building, Chicago, as original equipment for various types of electrically controlled machinery. Plunger movement may be as short as 0.005 in. or as long as 0.014 in. Operating force required to open or close the switch may be as low as 3 oz. or as high as 12½.

The sectional illustration shows how the switch works. Plunger A acts on the lever B, which is pivoted at C so that the roller D communicates the action to the under side of the alloy spring F on which one of the contacts is mounted. At the end of the spring there is an iron armature which is attracted to the permanent Almico magnet E. This magnet holds the switch in contact until the precise point is reached where the pressure on the spring overcomes the pull of the magnet. At this point, the spring kicks to its upper limit instantaneously. Similarly, when closing the action is instantaneous when the spring comes within the influence of the magnet.

Fluorescent Tube Lamp

SUPPLEMENTING its line of long-tube Cooper-Hewitt mercury vapor lamps, *General Electric Vapor Lamp Co.* has developed a new 100-watt tubular fluorescent lamp, 4 ft. in effective length. A special high efficiency fluorescent material is used for the inside coating of the tube, and ultra-violet radiations produced in the tube are converted by this coating to visible light.

Probably the most outstanding feature of these lamps, resulting from use of the phenomenon of fluorescence, is their high efficiency. Contrasting with the 100-watt bulb-type mercury lamp, for example, the initial efficiency of which is 35 lumens per watt (more than twice that of incandescent lamps of the same wattage), the efficiency of the 100-watt fluorescent lamp is 50 lumens per watt. The rated life of the fluorescent lamp will compare favorably with that of other industrial light sources.

Vaporproof Lamp Guard

BULB is completely sealed in an airtight design in the new vaporproof lamp guard recently announced by the *McGill Mfg. Co.,* Valparaiso, Ind. Cage of hard brass is formed of eight heavy wires and two interlocking bands. Inside the cage is a globe of pyrex glass, 3/16 in. thick. This globe is held in place by two brass bands crossing at right angles at the top of the globe and pressing it into a pliable rubber gasket at the base which serves as a seal. The handle is made of fire-resisting Insurok. Beads running the full length prevent it from slipping from the hand, and four projections on the upper rim keep the guard from rolling when laid down. The cable is sealed into the handle by an Insurok nut and rubber gasket. Guard No. 3002 is for lamps up to 60-watt size, and guard No. 3005, up to 100 watt. Either can be furnished with or without a reflector.

Conduit Fittings

PYLE-NATIONAL CO., 1334 North Kostner Avenue, Chicago, has added new standard conduit fittings—rectangular Pylets, FS and FD series Pylets, and vaportight lighting fixtures—to its line of heavy duty railway and industrial electrical equipment. The new Pylets include all standard types of threaded conduit fittings. The malleable iron bodies are galvanized and provided with a baked aluminum finish after galvanizing. Large wiring space is provided, and the rounded edges of the cover opening prevent chafing of wires. Top surfaces are ground for perfect seating of covers, and cover screw holes are counterbored for self-alinement of covers. The FS and FD series Pylets have square corners to take standard switch and receptacle plates, as made by wiring device manufacturers, as well as Pyle-National Triploc and Quel Arc plug receptacles.

Furnace Brazing of Cast Iron

(With Notes on Causes of Distortion of Furnace-Brazed Assemblies)

o o o

By H. M. WEBBER
Industrial Department, General Electric Co., Schenectady, N. Y.

o o o

ELECTRIC furnace brazing of cast iron calls for precautions usually unnecessary in the case of low-carbon steel, the furnace brazing of which has been discussed in previous articles by Mr. Webber. These precautions, together with possible causes of distortion in furnace-brazed assemblies in general, are dealt with in the present article, the ninth in the series. Discussion of distortion includes an interesting example of how strains from unequal expansion were successfully overcome.

TO furnace braze cast iron generally requires special consideration, and although usually it can be accomplished satisfactorily, there are a number of factors which enter into the picture not ordinarily encountered when furnace brazing the low-carbon steels.

Cast iron, in general, is not easily wetted by high-melting brazing metals such as copper, in the controlled-atmosphere furnace, because of the formation of silicon oxides and because of the high concentration of carbon in the iron. The silicon oxides are formed by impurities in the furnace atmosphere and they are not reduced by the hydrogen in the furnace atmosphere.

Cast irons can be obtained with different amounts of silicon and carbon, and are generally chosen with specific amounts for each application in order to get certain properties. When these elements are relatively low in percentages, copper will generally wet the cast iron without a great deal of difficulty, but when they are high in percentages it is sometimes difficult to make the copper wet the iron. The same holds true for other brazing metals such as brass or silver solder, although the oxidizing effect at lower temperature is not so great as at the high copper-brazing temperature and, therefore, wetting is not so difficult.

The wetting action can sometimes be improved by using a flux. Another scheme suitable for some grades of cast iron is to first oxidize then reduce the surfaces of the parts in furnaces previous to assembly preparatory for brazing. The inclusion of nickel as an alloying element in the cast iron is quite helpful in improving the wetting action, because of the good affinity of nickel and copper.

A factor to be considered is the effect of the furnace-brazing cycle on the structure of the cast iron. When the iron goes through the copper-brazing cycle, reaching a temperature of 2050 deg. F., or above, it generally comes out with a very hard skin which can be avoided if a lower-temperature brazing metal is used, such as brass or a silver-brazing alloy. Cast-iron sections are generally sufficiently heavy to require a long time in the heat, and during this long heating-up time sufficient zinc is likely to distill from the alloy so that its melting point will be greatly increased and, therefore, a high furnace temperature will be required. An exception to this condition is where the brazing metal can be embedded within the joints. In such cases distillation of the zinc is retarted considerably and the melting point of the alloy remains fairly constant.

The use of eutectic silver solder consisting of 28 per cent copper and 72 per cent silver, with no zinc, which melts at 1435 deg. F., is another way to avoid the zinc-distillation problem. Still another and perhaps a better way

is to use Easy-Flo silver-brazing alloy, which melts at so low a temperature (1175 deg. F.) that little or no harm is likely to come to the cast iron, oxidation of the silicon is at a minimum, and little or no zinc leaves the brazing alloy.

Precautions

Cast iron grows when being heated and cooled, such as in the furnace-brazing cycle, particularly when heated to high temperatures. Sometimes the outer member of an assembly grows larger than the inner member, opening up a gap in the joints which does not fill up with the brazing metal. Such a job would generally be unsatisfactory. If the outer member should be steel and the inner member cast iron, the growth of the iron would simply tighen the joint and a well-brazed job might result if the cast iron didn't stretch the steel beyond its elastic limit.

Cast iron with high concentrations of carbon has a very low melting point. When copper brazing it, care must be taken to use as low a furnace temperature as possible to avoid melting localized areas of the cast iron, particularly the light sections.

If the joint is long or deep, requiring the brazing metal to flow more than about ¼ in., it is generally advisable to embed the brazing metal within the joint is some manner, such as by inserting a wire ring into a groove in the inner member. Several such rings might be required, in a number of grooves, for exceptionally long joints. Slugs can be embedded in holes, strategically located, to serve the same purpose. When copper brazing steel such schemes might not need to be resorted to, although they are sometimes desirable; however the poor wetting quality of the cast iron makes such precautions necessary.

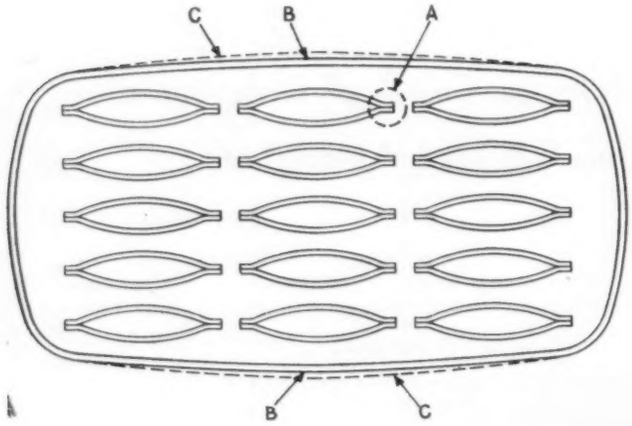
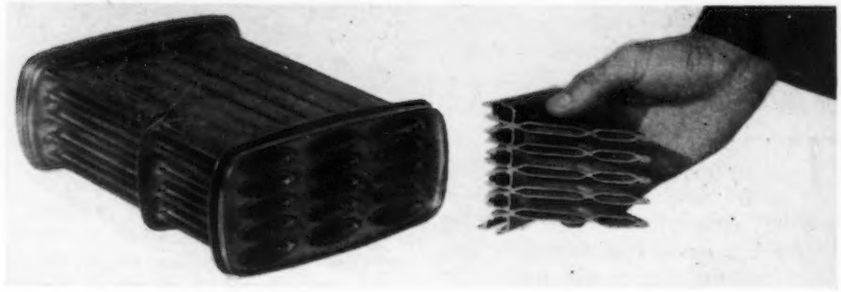


FIG. 80—Distortion of this tube sheet in the furnace-brazing cycle, caused by internal stresses imparted by the tubes, presented an interesting problem.

AT RIGHT

FIG. 81—Flanges drawn around the holes in the tube sheets were important in avoiding distortion, because they allowed greater flexibility for expansion. Uniform thickness of the plates which form the tubes is also important.



Causes of Distortion

THE distortion of furnace-brazed assemblies is generally small, due to the uniform heating, and is usually much less than that obtained by other fabricating methods using localized heating which sets up internal strains. However, the amount of distortion in a furnace-brazed assembly is dependent upon several factors, namely: Internal strains within the members imparted in punching, stamping, machining or other cold forming; strains set up due to differential expansion and contraction of the fitted members in the product while passing through the furnace-brazing cycle; and the method of supporting the assemblies to prevent sagging as they travel through the furnace.

Internal strains due to cold working are relieved as the assemblies are heated, and if severe they may result in warping of the parts. The fact that practically all applications of electric-furnace brazing are unhampered with this trouble and the others named above, is good evidence, however, that such strains can be kept within control.

Strains from Unequal Expansion

Strains from unequal expansion are sometimes encountered when furnace brazing and these may require careful study to overcome. A typical example of how such strains can be set up is where several tubes of oval section are pressed into headers, Fig. 80. This construction is used in the automobile heater core shown in Fig. 81. The tubular members are made of two flat plates, corrugated, rolled over at the edges and spot welded in the corrugations. The ends of each plate are notched out to form tubes, which in the original construction, projected through punched holes in flat tube sheets with flanged outer rims. It is the stresses set up by these tubes in the tube sheets which are of significance here.

Logically, the holes in the tube sheets were punched to have the same contour as the tubes passing through them. To assure strong, tight, leakproof joints one would be inclined to provide snug fits throughout, even leaning to a press fit if necessary. However, the development of this product brought out a number of points relating to design and manufacture which are a little out of the ordinary and should be of general interest.

Should it be possible to exactly match the contours and sizes of the tubes and the holes, no doubt this discussion would be unnecessary. But the manufacturer was confronted with the problem of variables, particularly with respect to the thickness of the steel strip used in making the plates. It was found that a pair of thin plates

behaved very nicely, but a pair of thick plates exerted a wedging action in the slots, as at *A*, due to the pressure required to force them into the slots. This wedging action naturally tended to open up the steel in the tube sheets surrounding the tubes, but the steel at room temperature had sufficient rigidity to resist this force. At the copper-brazing temperature, however, the steel lost this rigidity and yielded to the pressure, at times opening up gaps around the tubes as much as 0.020 in. When several pairs of thick plates occurred in one assembly, the entire tube sheet would become distorted, the edges *B* being pushed out as much as 1/16 in., taking the shape shown by the dotted lines *C*. Such distortion opened up practically all of the joints, of course, making it impossible to get tight bonds. It became necessary, therefore, to control the thickness of the plates quite accurately, which was done by swaging the ends and holding to close tolerances. Also the construction of the tube sheets was changed, to provide drawn flanges around the oval-shaped holes in order to give more flexibility where the tubes entered, as shown at the right in Fig. 81.

Each product to be furnace brazed has its own peculiar characteristics, so if any distortion should be found in the first attempts, a study of its construction and its previous history might make it possible to completely avoid distortion by making a few simple changes in the design or in the method of forming or assembling the parts. Sometimes a study as to the best way to set up and support the parts in the furnace is necessary.

(TO BE CONTINUED)

Village of Steel Homes to Be Built by Armco Employees

A VILLAGE of steel homes, known as Fertile Valleys Homesteads, will be erected near Middletown, Ohio, by employees of the American Rolling Mill Co.

Each home will be situated on an acre tract. There will be 60 acre homesteads in the project. Construction work will be started as soon as weather conditions permit. The total cost of the development will be approximately $300,000.

Walter R. McCornack of Cleveland, chairman of the committee on small dwellings of the Institute of American Architects, supervised their planning. Of self-framing, fire-safe steel construction, each house will be insulated and weather-stripped, and will be provided with a modern bath room, electric lights, furnace, and basement, including a special cold cellar for storing fruits and vegetables. Six different floor plans are available. Though all are one-story homes, they will vary in size and architecture. Prices will range from $4,500 for a two-bedroom home, including garage and laundry service room, to $5,300 for one containing three bedrooms.

Village Self-Governed

Donald Gray, nationally known landscape architect of Cleveland, will supervise the locating and lay-out of each homestead in the community which will be entirely self-governed. Each homestead purchaser will become a member of a community association, which will make and enforce the necessary restrictions and regulations to establish high community standards.

Sixty American Rolling Mill Co. employees will purchase the homesteads. A building company, known as Operative Homestead Builders, Inc., is being organized and the charter has already been granted. Only purchasers of homesteads can be common stockholders in this company.

"Our company has realized for years that good homes mean good citizens who take pride in their work and are a real asset to the community," Charles R. Hook, president of American Rolling Mill Co., said: "We have observed that when men live in the country they are far more secure and independent, and are not so seriously affected by the peaks and valleys of business. Moreover, they can give their families more of the comforts and conveniences of life over a period of time.

"With the five-day week," Mr. Hook continued, "a man at most spends only 40 hours on the job out of the 168 hours in the week. This gives him plenty of time to care for a garden and still have time for sleep and recreation."

Goodyear Celebrates Its 40th Anniversary

CELEBRATING the 100th anniversary of the discovery of vulcanization by Charles Goodyear in 1839 and the 40th anniversary of their company, representatives of the Mechanical Goods Division of The Goodyear Tire & Rubber Co., will be guests at the Akron, Ohio, factories Feb. 20-23 to participate in a gigantic homecoming.

Highlights of the combined homecoming and centennial celebration, which will be attended by 2000 Goodyear sales representatives from all parts of the world, will be: (1) Unveiling and dedication of a statue of Charles Goodyear in front of Akron City Hall, memorializing vulcanization's discovery; (2) a "rubber world's fair" of rubber products and historical materials in Goodyear Hall; (3) civic dinner sponsored by Akron Chamber of Commerce for 1600; (4) nationally known speakers.

Weirton Guests Dine, All Food From Cans

CHICAGO—One of the features of the National Canners Convention which was held at the Stevens Hotel in Chicago last week, was the annual dinner given by the Weirton Steel Co. to friends and customers attending the meeting. This year about 150 guests sat down to an elaborate banquet at the Chicago Athletic Club with every item on the menu coming from cans. A note at the head of the menu stated "Every item used in the preparation of this menu is a canned product purchased in the open market."

THIS WEEK ON THE ASSEMBLY LINE

By W. F. SHERMAN
Detroit Editor

. . . Auto Show month earlier than last year may alter buying plans . . . Production maintains contra-seasonal level, totaling 89,200 units last week . . . General Motors sets industrial safety record . . . Willys officials organize aircraft concern at Toledo.

DETROIT — On the brink of starting 1940 model designs through the cycle that will lead to tooling and finally production, the automobile industry is considering plans for earier announcement in the fall and a National Automobile Show four to six weeks earlier than its staging last year. At the same time, there is again conversation about the introduction of lighter cars—stimulated no doubt, by news that Studebaker and Packard plans are progressing rapidly toward fulfillment. Meanwhile, 1939 model production continued at a contra-seasonal pace with only a slight evidence of the tapering in output which is expected during February.

AN 18 by 8 foot solid steel surface plate is used by Pontiac to check full-sized chassis, bodies and completed cars for interferences between chassis and bodies or inaccuracies in the relation of chassis and body parts that occasionally creep into production. By the use of this plate errors are discovered and corrected long before they could be found under old cut and try methods. The plate is level within 0.005 in. from one end to the other. It is used also to check the geometry of the entire steering gear as to front wheel camber, castor, toe-in, wheel alinement and road clearance.

Production Off Slightly

Production last week totaled 89,200 units for the United States and Canada compared with 90,205 in the previous week and 59,365 a year ago, according to Ward's Automotive Reports. This level is 50 per cent above the comparative 1938 figure and represents a continued widening of the gap over 1938, since the previous week's comparison showed only a 38.1 per cent gap. Production continues well above the level of output in 1937 which is recalled as a 5,000,000 car year. Again we present the comparison of the 1937 model year with 1938 and 1939.

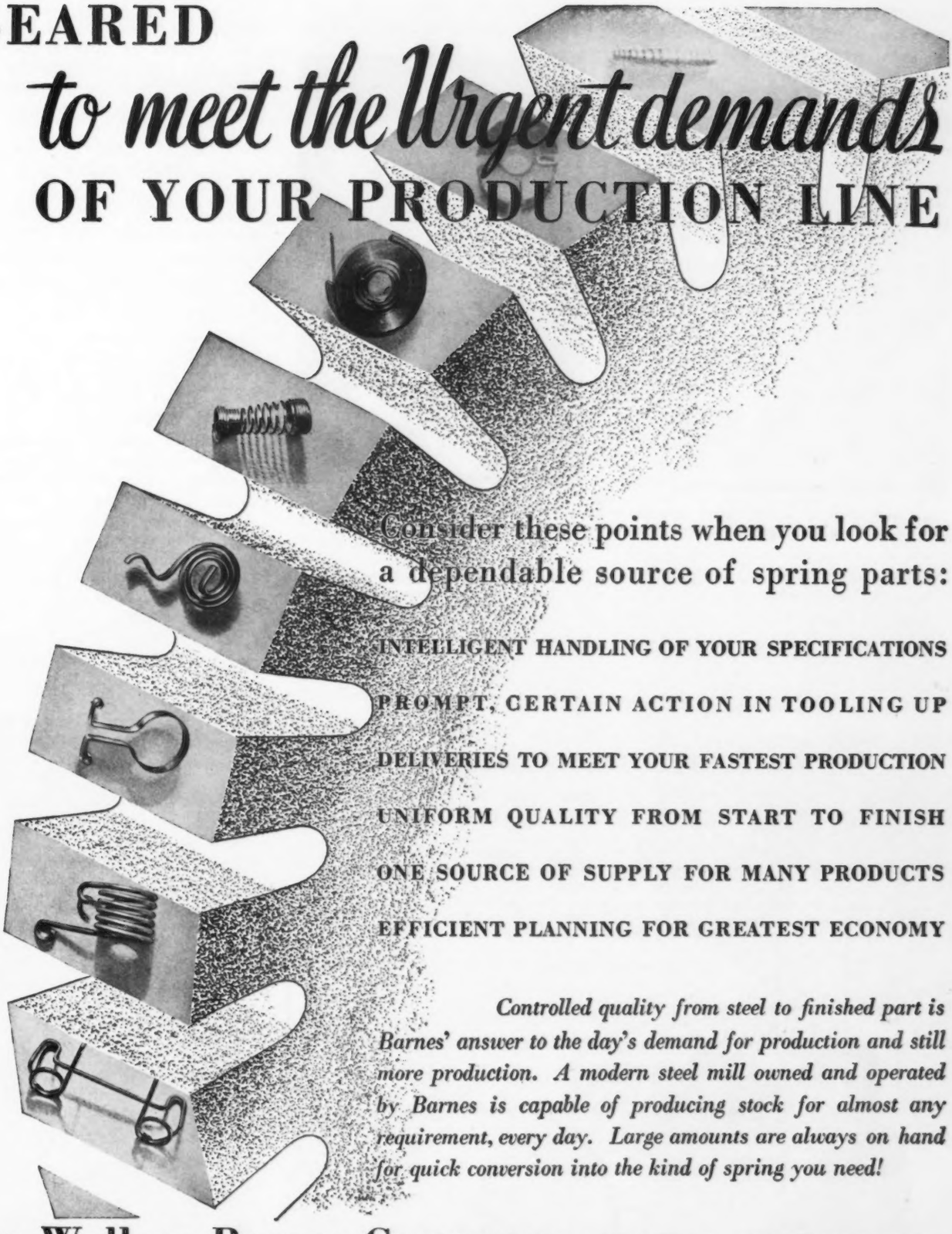
	1936-1937	1937-1938	1938-1939
Weeks corresponding to Jan. 16-20, 1939	72,509	65,418	90,205
Weeks corresponding to Jan. 23-27, 1939	76,620	59,365	89,200

Ford, Chevrolet and Plymouth continued to produce cars at exactly the same rate as the previous week and no change of importance was recorded, except a temporary shutdown at Willys.

Sales Are Spotty

Watching January new passenger car registrations carefully, the R. L. Polk Co. concludes that sales activity is spotty, with early reports in principal cities of the country covering an average of 17 days of the month as the basis of estimates. In the mountain regions, registrations are running 15.9 per cent better than in the corresponding period of December, while in the North-Central section (Illinois, Indiana, Michigan, Ohio and Wisconsin) registrations are down 30.58 per cent compared with December. Other

GEARED
to meet the Urgent demands
OF YOUR PRODUCTION LINE



Consider these points when you look for a dependable source of spring parts:

INTELLIGENT HANDLING OF YOUR SPECIFICATIONS

PROMPT, CERTAIN ACTION IN TOOLING UP

DELIVERIES TO MEET YOUR FASTEST PRODUCTION

UNIFORM QUALITY FROM START TO FINISH

ONE SOURCE OF SUPPLY FOR MANY PRODUCTS

EFFICIENT PLANNING FOR GREATEST ECONOMY

Controlled quality from steel to finished part is Barnes' answer to the day's demand for production and still more production. A modern steel mill owned and operated by Barnes is capable of producing stock for almost any requirement, every day. Large amounts are always on hand for quick conversion into the kind of spring you need!

The Wallace Barnes Company • **BRISTOL, CONNECTICUT**

DIVISION OF ASSOCIATED SPRING CORPORATION

SPRINGMAKERS FOR MORE THAN THREE QUARTERS OF A CENTURY

Barnes-made SPRINGS

sections of the country presented reports which varied all the way from a 15 per cent gain to a 24 per cent loss. General reduction in auto sales levels is typical of January and February. Meanwhile, individual companies showed substantial contra-seasonal gains. Buick, for instance, moved forward in sales in the second 10 days in January with a standing 43 per cent better than last year and 20 per cent better than was registered in the first 10 days of the month. At the same time, unfilled retail orders were 84 per cent greater than at this time a year ago. Oldsmobile, another General Motors unit, reported sales in the second 10 days more than 73 per cent greater than in the corresponding period last year, with unfilled orders 78 per cent higher.

Want New Models for Fairs

Interest in an earlier date for the National Automobile Show is attributable in part to the fact that there will be two world fairs open until about Nov. 1. Automobile manufacturers, some of whom will have very large exhibits at both fairs, are reported to be anxious to exhibit their products to fair visitors as early in the fall as possible. This would take the "edge" off a mid-November auto show, so it is likely that an earlier date will be set.

JOSEPH W. FRAZER, new president of Willys-Overland Motors, Inc. His career in the automotive industry and his rise to vice-presidency of Chrysler Sales Corp. was described in the *Assembly Line* last week.

Without a doubt, new models will be available for exhibit for the earlier date. Production plans are already being laid to provide for earlier operations on the new models. Any day now should see the release of large volumes of die work since it seems certain that bodies will undergo considerable change next year. Suppliers of forgings and stampings have already heard the hint that they may be asked to start production of parts as early as May for 1940 models to be introduced in August.

These changes in announcement dates will set new schedules for all suppliers. Sheet steel, for instance, is usually bought for trial runs in late May or early June. Buying of this sort should come a month earlier this year. Machine tool people may face an unexpected rush, depending, of course, upon the amount of change. If changes are considerable, requiring substantial purchases of equipment, there will be four to six weeks less time available to fill the orders. There is no question of allowing more time by starting earlier. The accepted starting date is already at hand. Feb. 1 usually marks the placing of initial inquiries and, in many cases, orders. In the next few weeks we should be able to sound the depth of the plans for 1940 and estimate, with reasonable accuracy, the volume of activity which will be forthcoming.

Included in the rumored possibilities for the next model year are light cars from both General Motors and Chrysler organizations. While there has been no definite indication from either of these companies that they will revive plans for cars smaller than the present Chevrolet and Plymouth, it is known that executives have displayed a great deal of interest in announcements of the light Studebaker and light Packard. The success which Willys has already enjoyed contributes to the interest which has been aroused. However, the sale of a smaller car would face such sharp competition from higher price used cars that many of the best sales minds in the industry doubt the success of such a venture.

Truck Demand Increasing

"Truck demand is fast assuming proportions that promise to engage our large production facilities to capacity,"

(CONTINUED ON PAGE 90)

THE BULL OF THE WOODS — BY J. R. WILLIAMS

OH, IF I COULD ONLY WRITE! THER'S A GREAT SHORT STORY RIGHT THERE -- GUY'S ABOUT TO GET FIRED FER SPOILIN' AN EXPENSIVE JOB-- JUST AT THE RIGHT MOMENT HIS TRUSTY PAL OPENS THE DOOR, TH' BOSS SEES HOW TERRIBLE IT IS TO TURN A GUY OUT INTO THE COLD, AND HE DON'T GIT FIRED
THAT'LL BE ALL RIGHT IF HE DON'T ASK THE TRUSTY PAL WHAT BUSINESS HE'S GOT OUT THERE - AND FIRE HIM BECAUSE HE SEEMS TO LIKE TO GO OUT THERE!
J.R.WILLIAMS
COPR. 1939 BY NEA SERVICE, INC. T. M. REG. U. S. PAT. OFF.
HEROES ARE MADE -NOT BORN
1-27

PRECISION BORING

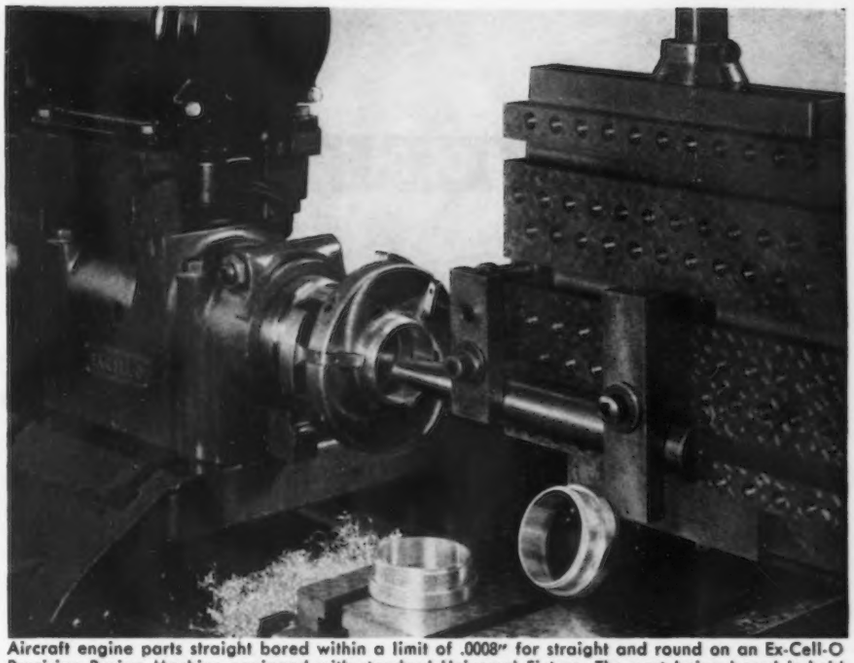
...at new low cost

UNIVERSAL FIXTURE QUICKLY SET UP FOR SMALL LOT PRODUCTION ON EX-CELL-O MACHINE . . .

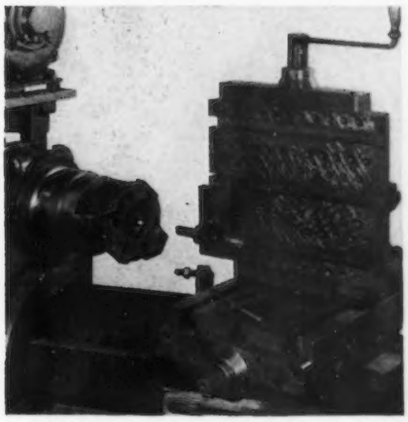
Now you can get "aircraft accuracy" at low production cost, with the same Ex-Cell-O equipment used by aircraft engine builders, adapted for short runs or a variety of bored, turned and faced parts. Single-point or fly-cutting gives you not only a uniformly smooth finish that reduces or eliminates polishing operations—it produces parts that are *strictly interchangeable*. You save by eliminating slow, expensive lapping operations.

Typical set-ups quickly and easily made on an Ex-Cell-O Precision Boring Machine, equipped with a standard Universal Fixture, are shown here. Any mechanic of average ability can set up jobs like these, and any semi-skilled operator can produce them.

You can choose from five standard machine styles, one that will suit your present production, yet can be later equipped with a special single-purpose fixture for regular runs. Descriptive literature on Ex-Cell-O Precision Boring Machines and Universal Fixtures will be sent on request.

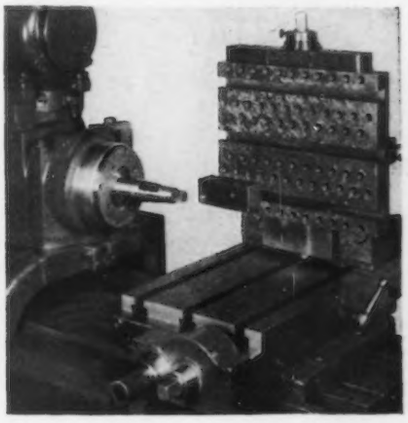


Aircraft engine parts straight bored within a limit of .0008" for straight and round on an Ex-Cell-O Precision Boring Machine equipped with standard Universal Fixture. The part being bored is held in a centrifugal chuck, and because it has a thin wall, is clamped on the face of a shoulder. Production with the simple set-up shown here, is 120 parts an hour.

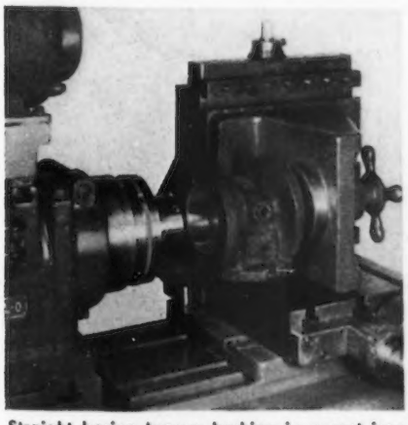


Drop-forged steel valve body held in a three-jaw scroll chuck. The Spindle is set at an angle on the bridge, for taper boring the welded Stellite seat.

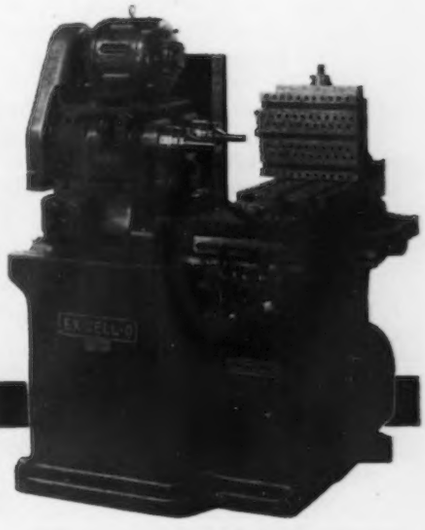
Diesel pump part made of alloy iron held in sub-fixture and clamped with thumb-screws on face of shoulder for straight boring the central hole within .0005".



Taper turning bronze key held on threaded adaptor. Spindle set at 10° included angle on bridge. Turning tool is withdrawn at completion of cut to eliminate draw-back line.



Straight boring bronze bushing in a cast iron valve body, held on the fixture by an expanding arbor. A micrometer adjustment is provided for the boring tool on the Spindle flange.



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Internal Grinding • Boring • Drilling • Milling • Center Lapping • Turning • Facing

THIS WEEK IN WASHINGTON

. . . Measures to tighten Public Contracts Act introduced in Congress . . . Hopkins' speech may shed light on new "era of good feeling" . . . AFL proposes Wagner Act amendments . . . Arnold amplifies Dec. 23 questionnaire sent to steel producers.

o o o

By L. W. MOFFETT
Resident Washington Editor
The Iron Age

o o o

WASHINGTON—Bills to tighten the provisions of the Public Contracts Act have been introduced in both Houses of Congress by Senator David I. Walsh, and Representative Arthur D. Healey, both Democrats of Massachusetts, co-authors of the contracts law which bears their names.

Unlike the bills pending in Congress last session which were aimed at black-listing Government contractors found to be persistent violators of the Wagner Act, a feature which was vigorously pushed by the CIO, the proposed Walsh-Healey revision contains no such provision. There are indications that it was omitted at the request of the AFL, which last session expressed opposition to the CIO proposal. The federation endorsed the principle involved in a blacklist but objected to the specific wording of the proposal which would have given the NLRB another opportunity to "discriminate between unions."

What Bill Provides

As described by Senator Walsh, the bill would, among other things, provide:

1. That the Public Contracts Act apply to all Government contracts and sub-contracts exceeding $2000 instead of the present limit of $10,000.

2. That the act apply to all Government contracts covering vessels and equipment construction and repair just as it now applies to Navy contracts.

3. That employers be permitted to make deductions for "board, lodging, or other facilities . . . customarily furnished by such employer to his employees."

4. That on second offense violations, employees can recover double the amount due them for underpayment of the prescribed minimum wage, or treble the amount in the case of subsequent offenses.

The Senator explained that the latter provision is necessary because under the existing law no penalty is provided except the drastic "blacklist" provision which has never been invoked but which permits the Secretary of Labor to put on an ineligible list violators of the act for a three-year period.

The proposed amendments also would include under the act for the first time so-called non-professional service contracts and would adopt the child-labor restrictions of the Fair Labor Standards Act. The amendments would become effective three months after passage by Congress.

The bill is generally expected to stand a much better chance of passing than did the CIO-sponsored measure introduced last session.

AFL Proposes Amendments To Make Wagner Act "Fair"

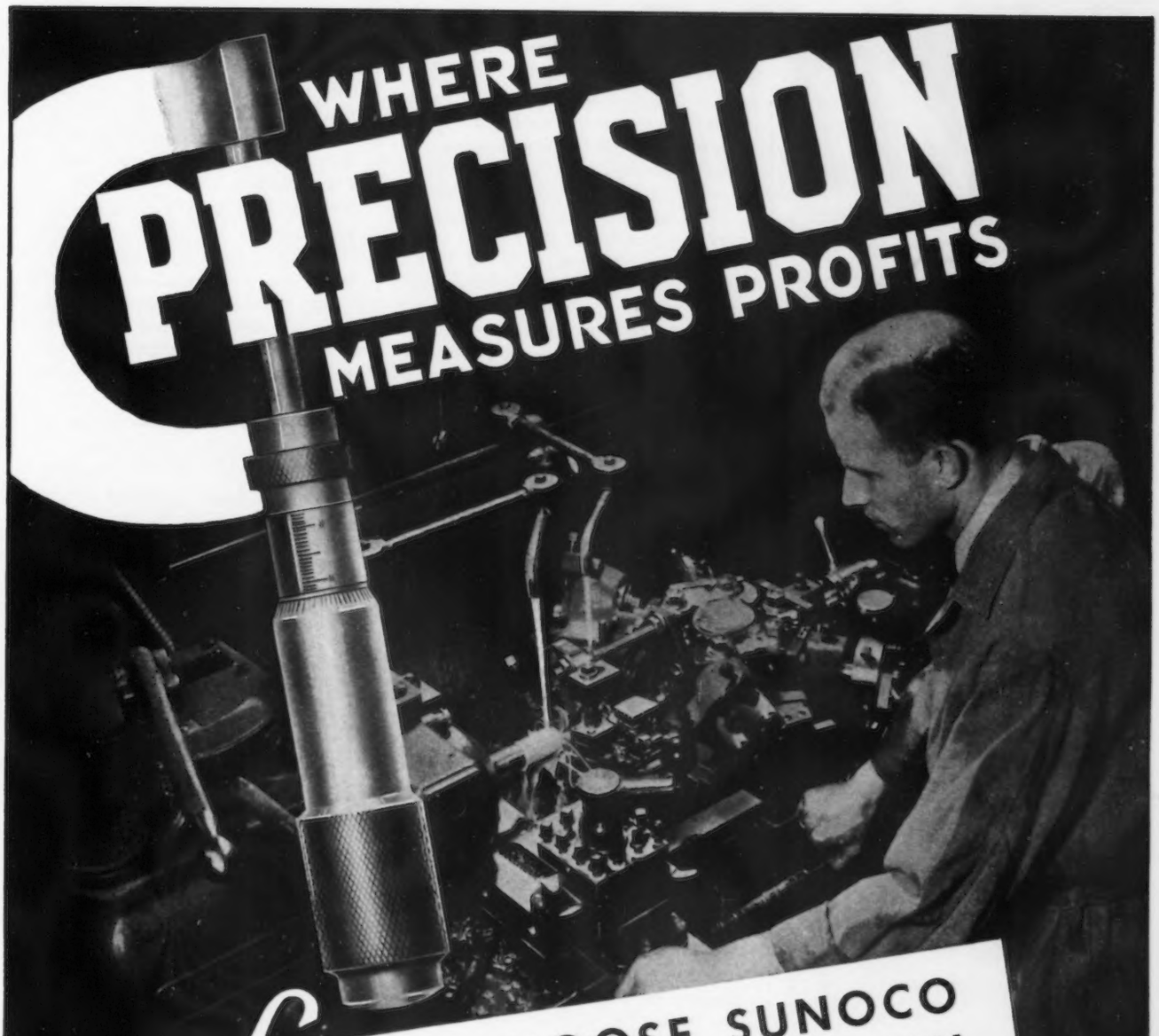
WASHINGTON—The AFL's design for living under an improved labor law was submitted to the Senate last week in the form of proposed amendments to the National Labor Relations Act introduced by Senator David I. Walsh, Democrat of Massachusetts. Although the proposed revision of the act would not relieve business to the extent suggested in industry-sponsored amendments, one of the changes embodied in the bill would permit the labor board to investigate petitions for collective bargaining elections filed by an employer and to order the election.

William Green, president of the AFL, who described the bill as one designed to "guarantee fair and equitable administration" of the Wagner Act, said in a statement that the proposed provision empowering the NLRB to investigate petitions from employers and to hold the requested employee elections was identical to a section in the New York State labor relations act which he said had worked out successfully. At present, the AFL president said, the NLRB "arbitrarily refuses to entertain such petitions even though there is nothing in the National Labor Relations Act which would close the door to such action."

What Bill Proposes

As described by Green, the Walsh bill proposes "(1) to make it obligatory on the board to respect the right of craft groups to decide for themselves by majority vote who their bargaining representative shall be; (2) to curtail the assumed power of the board to invalidate legal contracts between employers and labor organizations; and (3) to correct the board's procedure so that all parties affected by any case will be given due notice, accorded a fair hearing, protected

WHERE PRECISION MEASURES PROFITS



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PETROLEUM PRODUCTS FOR ALL INDUSTRIES

against abuses of discretion and assured of adequate judicial review of wrongful decrees."

The Walsh amendments followed by little more than a week the House measure drafted by Congressman Anderson, Democrat of Missouri, which was designed to extract from the NLRB its powers of both "judge and jury" by restricting the board's power to recommendations, with the United States Circuit Court deciding each case. Unlike the Anderson measure, the AFL bill is expected to gain wide acceptance in Congress. Hearings are virtually assured and many Congressional members already have expressed approval of the measure. But the biggest unknown factor involved is the Administration's attitude toward the bill.

White House Support Doubtful

Despite President Roosevelt's remarks in his annual message that ways must be found to end labor disputes and that several New Deal reform measures "still need some machining down," it is doubted that the White House will throw its support behind the measure. To do so would run the risk of alienating John L. Lewis' CIO, which has vigorously expressed itself as opposed to any change in the Wagner act. Rather, the Administration can be expected to adhere to the theory expounded many times at White House press conferences that changes in the law are inevitable over a period of time and are evolutionary in character. Administration lieutenants have frequently expressed the view that changes in the law are being made constantly by judicial interpretation and that any substantial revision should be held in abeyance pending further court decisions.

Introduction of the AFL measure was recognized as a healthy sign in the unsettled labor relations picture but it served to emphasize the fact that an apparent inability to reconcile all forces moving in the direction of Wagner act revision continues to hamper moves aimed at securing passage of any substantial changes in the law.

Edison Case Cited

Mr. Green, in announcing the outstanding features of the proposed amendments, took advantage of a recent Supreme Court interpretation of the Wagner act covering the Consolidated Edison by including a provision which seeks to curtail what he called the board's "assumed power to abrogate contracts between an employer and a labor organization."

Under the proposed amendment the board would be prohibited from taking such action unless (1) the contract is with a company union, (2) the contract is for a closed shop and entered into with a minority, or (3) the contract denies to a representative designated by a majority in an appropriate unit the right to bargain exclusively for such unit.

"The American Federation of Labor was the original sponsor of the National Labor Relations Act," the AFL president recalled. "It is only fitting that the Federation should now take the lead in saving this law from being wrecked by those who seek to pervert its principles for the advancement of a single group in the nation's economic life."

Act Seen Strengthened

The provisions, which represent the nine recommendations for revision of the act unanimously adopted by the last AFL convention, are expected by Mr. Green to strengthen "the fundamental purposes of the act by preventing arbitrary abuses of discretionary power by the board which have aroused the resentment of the entire nation."

They provide that:

(1) Every known interested party must be served with due process and afforded an opportunity to appear in any case. (The AFL charged in this connection that the board has ordered the abrogation of contracts without even giving labor organizations which are parties to such contracts the right to be heard.)

(2) Definite but adequate time limits be established within which the board must act on petitions for elections and on complaints of unfair labor practices. (Many AFL unions charge that now the board deliberately delays acting on their petitions and expedites action on the petitions

Here Is Debated Wage Law Section

"ALL persons employed by the contractor . . . will be paid, without subsequent deduction or rebate on any account, not less than the minimum wages as determmined by the Secretary of Labor to be the prevailing minimum wages for persons employed on similar work or in the particular or similar industries or groups of industries currently operating in the locality in which the materials, supplies, articles or equipment are to be manufactured or furnished under the contract."

—Section Four, Article 1B, Public Act No. 846 Regulations of the Secretary of Labor.

of rival groups to further the interests of such hostile groups.)

(3) Decisions of the board in representation cases which cannot now be appealed because of legal technicalities will be made reviewable in the courts.

(4) Secrecy of the board's files must be lifted to the extent that interested parties may be permitted to examine material on which decisions are made.

(5) Rules respecting the issuance of subpoenas be liberalized.

(6) Affidavits of prejudice may be filed within certain limits against trial examiners considered unfair by any party in a case.

(7) Employers may express opinions on matters of interest to their employees or the public provided that such opinions are not accompanied by acts of discrimination or threats thereof. (AFL said the Supreme Court in the Consolidated Edison case, "challenged the authority of the board to scuttle the rights of free speech guaranteed by the Constitution.")

(8) The board may investigate petitions for an employee election filed by an employer and order such an election.

LaFollette Labor Measure Coming

WASHINGTON. — The LaFollette Civil Liberties Committee, which for the past two years has piled up voluminous records on alleged violations of freedom of speech and interference with labor organizations, reported to the Senate last week that it is drafting legislation designed to prohibit employers from engaging strikebreaking organizations.

Committee Chairman LaFollette, Progressive of Wisconsin, and Senator Thomas, Democrat, of Utah, said that the legislation to be proposed will not affect the right of employers to provide legitimate and bona fide watchmen or patrolmen to guard premises, nor will it deprive employers of "rightful means of self-protection."

The announcement was made in a report to Congress on the committee's study of "strikebreaking services" which, LaFollette said, was one of a series of reports to be issued by the committee. Other reports, covering separate studies, will relate to company police, industrial munitioning, employers' association, the "little steel" strike, and industrial espionage.

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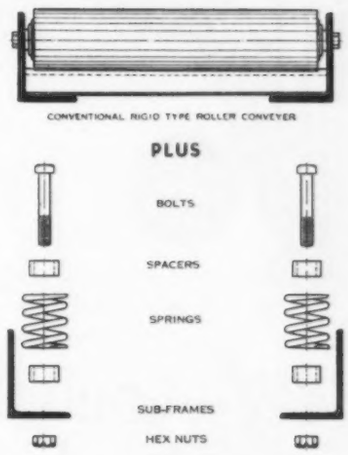
WHY . . . . to lower maintenance costs.

WHERE . . . where the service is abusive to rollers, bearings, and axles.

WHEN . . . for new installations or to replace old equipment.



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Mathews Spring Mounted Conveyers are Protected by United States Patents Nos. 1,518,836; 2,077,188; 2,077,189; 2,077,190; 2,107,822 and Other Patents Pending.

CAUSE AND EFFECT

THE principle is simple; the roller axles are rigidly locked in the frame as in the conventional "rigid type" construction, but the conveyer frame which retains the rollers is carried on pre-compressed coil springs, the springs held in compression equal to the rated safe load of each roller. Under impact conditions or excessive loads the springs absorb the overload.

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TYPE 33, Rollers 1⅝", 1.9", 2¼", 2½" diameters, 150 lbs. capacity per roller.

TYPE 53, Rollers 2 9/16", 3½" diameters, 600 lbs. capacity per roller.

TYPE 58, Rollers 3½" diameter, 2000 lbs. capacity per roller.

TYPE 63, Rollers 4¼" diameter, 4000 lbs. capacity per roller.

TYPE 110, Rollers 5" diameter, 8000 lbs. capacity per roller.

Ask for Data Sheet 24-A & B. It contains complete engineering data. The book "Equipping Industry for Continuous Production" illustrates installations. Both items sent upon request.

MATHEWS CONVEYER COMPANY

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CONTINUOUS FLOW PRINCIPLE OF HANDLING MATERIALS

Arnold Modifies First List of Questions For Steel Industry

WASHINGTON—Assistant Attorney General Thurman Arnold last week sent out a letter modifying the first Department of Justice-Federal Trade Commission steel questionnaire (Form B) in response to requests that certain of its features be clarified.

Desiring uniformity in reporting, Mr. Arnold requested the steel companies to consider the following determinations an integral part of the instructions which accompanied the questionnaire, sent Dec. 23:

"Column (4) which is now headed 'Freight charges added to base prices to arrive at invoiced value per column (3)' should be interpreted to mean 'Freight charges from nearest basing point, freightwise, to point of delivery' in all instances in which the delivered price is not computed directly from a base price plus freight.

"In the case of shipments to third parties, including fabrication-in-transit shipments, consuming district means district of ultimate destination.

Report Total Exports

"All direct shipments, including shipments for the account of affiliated companies and shipments for the account of jobbers or other distributers, are to be tabulated by consuming districts. Such shipments are not to be included under 'Other shipments.'

"In the case of 'exports' it will be sufficient to report total tonnage shipped and the aggregate value at the mill of such shipments leaving columns (3) to (6) inclusive blank.

"In the case of 'f.o.b. mill sales' columns (4) and (5) should be blanked out, since no freight is involved.

"In the case of 'shipments to plants or warehouses of the same or affiliated companies' please observe the following:

(a) Shipments to warehouses (i.e., for resale) of the same or affiliated companies may be reported in tonnage only, columns (3) to (6) inclusive being left blank.

(b) Shipments to fabricating plants of the same or affiliated companies, however, should be reported in all six columns. A fabricating plant means a plant engaged in the further processing of steel into such products as ships, all forms of structures, fence, posts, and other wire products, pipe and tubes, etc

"If shipments to warehouses are reported in tonnage only, they should be reported separately and *not aggregated with shipments to fabricating plants.*

"'Shipments to jobbers' warehouses' means shipments which are outright sales but which are made for resale, whether the buyer be classified as a jobber, retailer, or distributor. For these shipments, column (4) may be blanked out but the data in the other columns (2) to (6) inclusive are required.

Wire Reference Classified

"Companies requested to report data on Form B for 'Plain wire, drawn' will please observe the following definition of this product: Plain wire, drawn, means wire which is

Saved—enough to paint the plant

The money that long-lived "Greenfield" "Rex" Gages saved one manufacturer was enough to paint his whole plant.

"Rex" Gages will save money for you, too. The extra long life is due to "Greenfield's" exclusive surface treatment, which produces a tough, hard finish several times more wear resistant than an ordinary gage. Specify a "Rex" Gage on your next order.

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sold in the bright state only, excluding all wire receiving special treatment after drawing."

Form B asks for information on both distribution and prices for February, 1939, and covers 10 products. However, this does not mean that each company, even though it may make all of the products being considered, is to report on all of them. On the contrary each company has been advised of the particular works and the products at such works on which it is to report. There are instances, for example, where a company which makes all or nearly all of the products is requested to report on only two or three of them, the other products to be covered by makers in the same area. It was stated at the Department of Justice that both in the choosing of the works and of the products the selection was made in order to minimize the task of any reporting company and at the same time provide an adequate sample for the purpose of analysis.

Answers Found Difficult

It is reported, however, that despite the effort to simplify the questionnaire, a number of companies have indicated it will be a difficult if not impossible, undertaking to furnish the information in the form desired.

In Form A, sent out on Jan. 24, information is asked regarding the distribution of 24 products for the years 1936, 1937 and 1938. It stated that the purpose of this questionnaire is to get a picture of the distribution of selected steel products with respect to the concentration of capacity for the manufacture of such products. This questionnaire was sent to three groups of companies who keep records of distribution by (1) districts only; (2) states only, and (3) states and counties, using punch cards. This latter group has been requested to give a complete breakdown as indicated on the form.

Reports are to be made on separate sheets for separate works. Instructions urge that "under no circumstances must the data combine the operations of works in different basing point areas." Also, if available, each company is requested to give the most important destination-plant location of its four largest customers of each of the selected products for which shipments data are required.

The information to be obtained from the questionnaire will be submitted to the Temporary National Economic Committee. A statement issued by the committee said the information is expected to furnish a basis for the evaluation of important problems of the iron and steel industry "which have been the focus of controversy for many years."

Effect of Iron Hauling

Among the matters which will be illuminated, the TNEC statement said, are the following:

"Whether market interpenetration is a general characteristic of the industry or is confined to particular products or to specific areas; whether cross-hauling of freight which has been frequently characterized as an economic waste constitutes a significant or a negligible portion of the price of steel; whether base prices constitute a fair index of steel costs to the buyer; whether extras constitute an important element in the price of steel.

"These matters are close to the heart of the problem of pricing iron and steel products, but no data are now available in public sources which permit their analysis."

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New Measure Asks House Investigation Of the Labor Board

WASHINGTON — Representative C. Arthur Anderson, Democrat of Missouri, who previously introduced a House bill to take from the National Labor Relations Board its judicial function in handling labor disputes, launched another anti-NLRB proposal last week in the form of a resolution to investigate the board in the interest of producing "harmony in industrial relations."

The resolution called for an appropriation of $50,000 to be spent by a 10-man committee of the House whose job would be to investigate the personnel of the board, recommend changes in the present set-up including the Wagner Act itself, and report to Congress not later than June 1.

Anderson, who estimated that the NLRB has spent approximately $2,300,000 during the past fiscal year, advanced his proposal as necessary to "bring about confidence from capital and labor" with a resultant return to prosperity.

"The records show that the board has not functioned as was intended," the Congressman said. "It has been partial, unfair and despotic. Its conduct has been such as to create suspicion of its motives among the American people. Its personnel has been charged with agitating strife and discontent instead of soundly administering the law as intended.

"Its activities and decisions have been of such a character that the oldest labor group in the nation, the American Federation of Labor, has demanded amendment of the act and has served notice that it will oppose confirmation of one of the present members of the board."

The Anderson resolution is similar to one sponsored last session by Senator Edward R. Burke, Democrat of Nebraska and bitter critic of the NLRB. Burke's proposal was unsuccessful but criticism of the labor board has consistently been on the increase since that time.

Harvester-Thresher Units Gained in 1938

WASHINGTON—Bureau of the Census figures covering incomplete returns from manufacturers of farm equipment and related products show that 1938 production of tractors amounted to 187,487 units valued at $150,354,719, a decrease of 34 per

cent under the value of tractors produced in 1937. On the other hand, combine (harvester-thresher) units totaled 46,561 valued at $34,623,737, an increase of 63 per cent over the value of 1937 production. Grain threshers totaling 8349 units valued at $7,374,482 were produced during 1938, which represented an 82 per cent increase over the value of 1937 production.

Method Found for Counting Paint Coats

WASHINGTON. — Representatives of one of the manufacturers of metal shelving visited the National Bureau of Standards recently and demonstrated a simple method for determining the number of coats of paint or lacquer on a surface, says a bureau statement. The coating is abraded down to the metal with fine waterproof sand—or emery—paper in water over an area of two or three sq. in. The boundaries between the coats show as distinct lines, much like the isobars on a weather map. The bureau found, afterwards, that fine emery powder and water will give even better results than the abrasive paper.

Heretofore, microscopical examinations of the edges of thin slices cut from a flake of the coating was the routine practice used. The formation of an insoluble film on the surface when a coat of paint dried and the presence of the pigment made it possible to distinguish the boundary lines between two coats. To determine the number of coats of lacquer, however, was much more difficult because the surface of each coat tended to dissolve in the succeeding coat, and a well-defined boundary between the two was rarely found.

The new method, the statement says, is a great improvement over the microscopical method as it is both time-saving and less troublesome.

Aluminum Exports Increased in 1938

WASHINGTON—Valued at $6,483,695, exports of aluminum and aluminum products, except finished manufactures, in 1938 topped the $3,988,266 trade of 1937 by a margin of more than 60 per cent, the Commerce Department reports. Imports, on the other hand, decreased sharply and were valued at $6,875,900 compared with the $11,737,848 trade of 1937, according to preliminary figures released by the Metals and Minerals Division.

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Business Awaits Hopkins' Speech On His Policies

WASHINGTON—The Administration's latest plan for inaugurating a "new era of good feeling between Government and industry" may be revealed in a week or two when Henry L. Hopkins, the new Secretary of Commerce, is expected to make a speech setting forth his policy while head of the Government department which is closest to business.

The former WPA Administrator announced at his first press conference since confirmation that he would state his position in a forthcoming speech but declined to say where or before what group the message would be given. Mr. Hopkins made the announcement by way of turning aside questions as to what his program of action would be, explaining that he didn't want to make any casual comments before the speech.

Politics and Relief

Since his appointment to the new post, Mr. Hopkins has been linked in stories with Administration plans to reemploy idle workers, to conciliate the long-standing controversy between the AFL and the CIO, and to negotiate a settlement between the Administration and the utilities. Although he issued a blanket denial of all these reports, it is no secret that the Administration is leaving no stone unturned to offset the widespread impression that as WPA Administrator Mr. Hopkins allowed his relief organizations to become too closely affiliated with politics during the 1938 political campaigns and showed a reckless disregard in disbursing Government relief funds.

The new Secretary of Commerce has conferred with numerous business leaders since becoming a member of the Roosevelt Cabinet. He met for the first time with members of the Commerce Department's Business Advisory Council last Thursday, when the council held a meeting which had previously been scheduled by former Secretary of Commerce Roper. Questions up for discussion included social security, taxes, labor relations and other matters.

The council, which was reported to be "very much impressed with Hopkins' approach to the task," re-elected as chairman W. A. Harriman, board chairman of the Union Pacific Railroad.

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Consolidated Steel Gets Welded Pipe Award

WASHINGTON.—The Consolidated Steel Corp., Ltd., Los Angeles, will furnish and erect the welded plate-steel pipe for two siphons for the Heart Mountain Canal, Shoshone Project, Wyoming. The Consolidated Steel bid was $212,100. Award of contracts for the construction of the siphons, to be built for the Bureau of Reclamation, Department of the Interior, were announced last week. The Utah Construction Co., San Francisco, on its bid of $84,537.50 was awarded the contract for excavating and placing the concrete for the Shoshone siphon. A contract for earthwork and concrete for the Buck Springs Creek siphon was awarded to the Barnard-Curtiss Co., Minneapolis, on a bid of $31,864.50.

. . PERSONALS . .

W. A. HUBER, who has been identified with the Jones & Laughlin Steel Corp., Pittsburgh, since 1936, has been appointed manager of sales of the Gilmore Wire Rope Division of the company. Prior to his connection with Jones & Laughlin, he had been in public accounting and sales work for a number of years.

❖ ❖ ❖

FRANK K. CHILES has been made assistant manager of sales in charge of the bar division of the Andrews Steel Co., Newport, Ky. At one time he held positions with the Carnegie Steel Co. and the Illinois Steel Co. Subsequently he became manager of sales, bar division, of the Corrigan McKinney Steel Co. After the company's merger with the Republic Steel Corp., he was connected with the general sales staff of the latter for some time.

❖ ❖ ❖

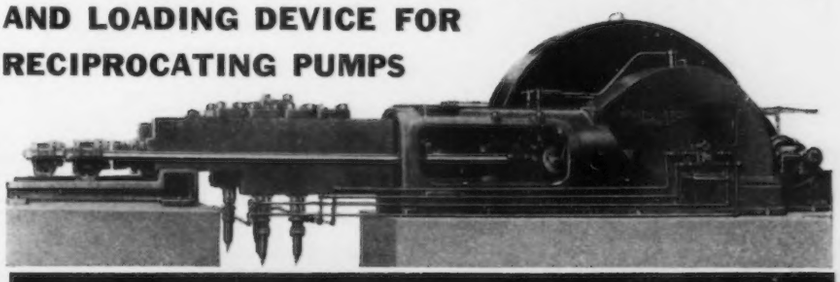
WILLIAM P. EWING, executive vice-president, Superior Steel Corp., Pittsburgh, has been made a director, filling a vacancy caused by the resignation of DAVID PRYDE, who remains vice-president of operations for the company.

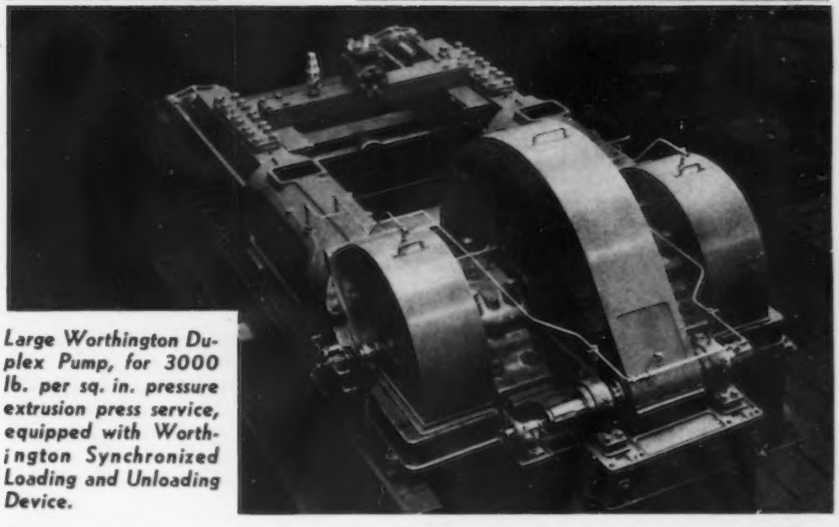
Mr. Ewing started his association with Superior in 1918 as a tracer clerk in the production department and sub-

W. A. HUBER

F. K. CHILES

WORTHINGTON SYNCHRONIZED UNLOADING AND LOADING DEVICE FOR RECIPROCATING PUMPS





Large Worthington Duplex Pump, for 3000 lb. per sq. in. pressure extrusion press service, equipped with Worthington Synchronized Loading and Unloading Device.

THIS device, as illustrated above on a horizontal duplex double-acting pump, establishes a new standard of design for the automatic control of high-pressure pumps. It involves a control for motor-driven power pumps which, when operating continuously and at constant speed, may be briefly defined as follows:

MEMBER HYDRAULIC INSTITUTE U.S.A.

SYNCHRONIZED UNLOADING . . . A quick but gradual decelerating fluid delivery, from full to zero flow, in not more than one-half revolution of the pump.

SYNCHRONIZED LOADING . . . A quick but gradual accelerating fluid delivery, from zero to full flow, in not more than one-half revolution of the pump.

• *Literature available*

PP9-2

WORTHINGTON PUMP AND MACHINERY CORPORATION

General Offices: HARRISON, NEW JERSEY

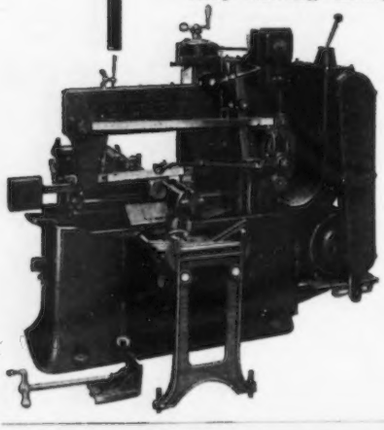
100 Years of Service

MARVEL

you are paying too much for

CUTTING-OFF!

Unless you have one or more new heavy-duty, super high speed MARVEL Automatic Hack Saws, you are paying too much for cutting-off. No other machine of comparable accuracy will cut off an equal number of pieces from bar stock in diameters to 10" with such speed, at such low labor cost, power cost, tool cost or with such small chip loss. Far heavier, and all ball-bearing, these MARVEL Automatic Saws No. 6A and 9A are built for continuous operation at speeds, feeds and blade tensions impractical for other equipment. They will cut off identical lengths, 10 pieces of 6" round, 160 pieces of 1½" round every hour floor-to-floor, and other sizes proportionally. They cut off squarely and accurately—save stock *and machining*. While strictly production tools that require no more attention than an automatic screw machine, MARVEL Automatics are also multi-purpose; will handle all run of the shop sawing easily and efficiently—bar push-up can be disengaged at any point, miscellaneous cuts made, and automatic operation resumed by re-engagement of the bar feed drive.



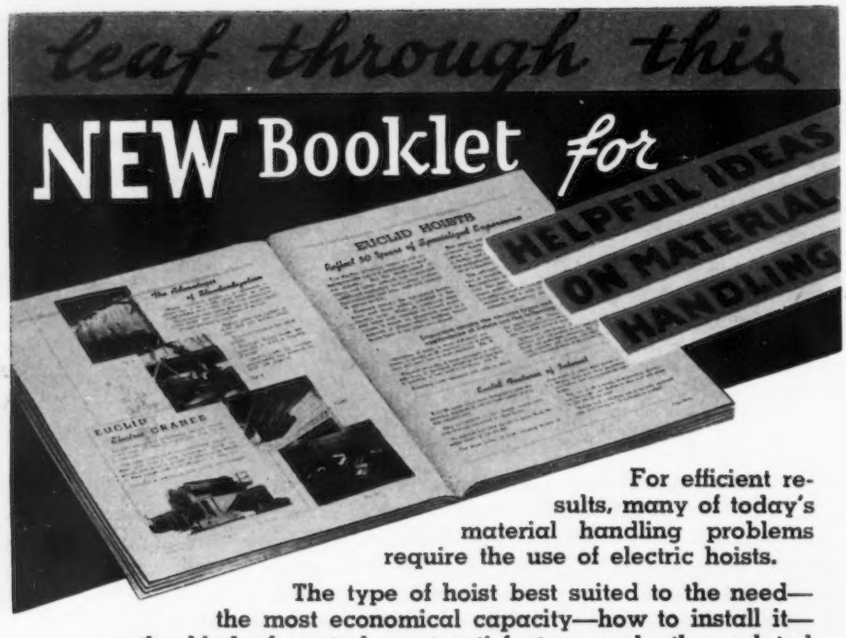
MARVEL 6A (Capacity 6"x6")
MARVEL 9A (Capacity 10"x10")

Note: These machines are available without automatic Bar push-up, with or without 4-speed transmission. The MARVEL Line, the most complete line built, provides saws exactly suited to each shop—from small low priced general purpose saws to giant hydraulics.

ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"
5749 Bloomingdale Ave., Chicago, U.S.A.

leaf through this

NEW Booklet *for*



For efficient results, many of today's material handling problems require the use of electric hoists.

The type of hoist best suited to the need—the most economical capacity—how to install it—the kind of control most satisfactory and other related questions always present themselves when new equipment is considered.

These and other questions are answered in an interesting and helpful way in this condensed, well illustrated booklet.

Write for a copy today.

The EUCLID CRANE & HOIST Co.
1361 CHARDON RD. EUCLID, O.

EUCLID CRANES & HOISTS

C. B. BOHN

sequently was promoted to the sales department, assistant sales manager, sales manager, and finally vice-president of the company, which position he now holds.

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CHARLES B. BOHN, president and founder of the Bohn Aluminum & Brass Corp., Detroit, has been elected president of the Aluminum Association, succeeding ARTHUR V. DAVIS, who had been president of the association since its formation in 1933.

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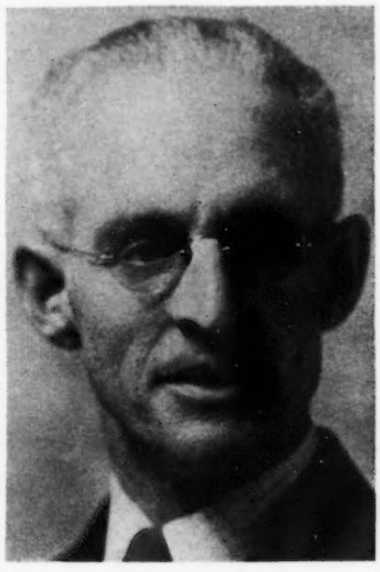
DONALD B. PATTERSON, for the past three years Chicago district sales man-



G. A. MITCHELL

D. B. PATTERSON

ager of the Shaw-Box Crane & Hoist Division of Manning, Maxwell & Moore, Inc., Muskegon, Mich., has been appointed general hoist sales manager, with headquarters at Muskegon. G. A. MITCHELL, who has been sales manager of this division for the past five years, has been appointed sales promotion manager. Prior to the purchase of Box Crane & Hoist Corp. by Manning, Maxwell & Moore, Inc., Mr. Mitchell was secretary and sales manager of the former corporation.

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H. G. ALEXANDER has been advanced by directors of National Screw

H. P. LADDS

LEE
Quality Springs
ALL SHAPES · ALL SIZES · ALL MATERIALS

LEE SPRING COMPANY, Inc.
30 MAIN STREET BROOKLYN, N.Y.

LEE-BUILT TRADE MARK SPRINGS

1854 1939
BOLTS NUTS SCREWS RIVETS
CLARK for Quality
and that means full-range quality—quality in materials, workmanship, packaging and service. No order too large or small for prompt delivery.
Write for catalog.
CLARK BROS BOLT CO.
MILLDALE, CONN.

& Mfg. Co., Cleveland, to the board chairmanship from the presidency, and HERBERT P. LADDS has been named president and a director. D. C. GRIESE has retired as chairman. He will remain a director. Mr. Alexander has served as president since the death, in 1929, of his father, W. D. B. Alexander, one of the company's founders. Mr. Ladds, who will assume his executive duties about March 1, will resign from the presidency of Sweet's Steel Co., Williamsport, Pa., a position he has held since October, 1937. From 1928 to 1937 Mr. Ladds was with Lamson & Sessions Co. and Lake Erie Bolt & Nut Co., serving as sales manager of the latter company until it merged with Lamson & Sessions in 1929. He then became in turn assistant general sales manager, general sales manager, and vice-president and general manager of the Birmingham plant. Prior to 1928 Mr. Ladds was vice-president and general manager of the Maryland Bolt & Nut Co., Baltimore.

CHARLES F. NEWPHER, vice-president in charge of sales of National Screw & Mfg. Co., has been made a director.

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FRED M. STURGESS, chief electrician and master mechanic, Tennessee Coal, Iron & Railroad Co., and chairman of the Birmingham district section of the Association of Iron and Steel Engineers, has arranged the program for the spring conference of the association to be held at Birmingham, March 27 and 28. Among the technical papers to be presented are "Unique Features in Southern Blast Furnace Practice," "General Types of Lubricants Essential to the Steel Plant," "Modern Wire Drawing Practice," and "Modern Soaking Pits." Inspection trips will be made to steel plants in that area and to the works of the American Cast Iron Pipe Co.

F. M. STURGESS

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A. C. DYER, who has been Pittsburgh district manager of the Electric Controller & Mfg. Co., Cleveland, since 1916, has become sales manager of the company, effective March 1. A graduate of Carnegie Institute of Technology in 1911, he worked in the electrical departments of West Penn Steel Co., and Allegheny Steel Co., and the Homestead works of Carnegie-Illinois Steel Corp. before joining the Electric Controller & Mfg. Co. in 1913. R. G. WIDDOWS, who has been sales manager and vice-president of the company, will continue as vice-president in an executive capacity.

LA SALLE'S *NEW* BAR STEEL

No Heat Treating! No Case Hardening! No Warpage After Machining!

STRESSPROOF *No. 2*

T. M. REG. U. S. PAT. OFF.

WORM SHAFT

Machined at 165 S.F.P.M. Absolutely no warpage.

STOKER SHAFT

After 2265 hour test with 50% overload, teeth show no wear.

LEAD SCREW

One user reports total variance of lead of only .0004".

● Parts made from STRESSPROOF No. 2 are ready for service following the last machining operation because as received by you, STRESSPROOF No. 2 has a minimum yield point of 100,000 lbs. per sq. in.; unique wearability and freedom from warpage.

● STRESSPROOF No. 2 is not presented as the full equal to heat treated alloy steel or a case hardened steel but laboratory tests, production tests and the experience of hundreds of users have proven that it will satisfactorily serve for numerous applications now produced from heat treated or case hardened steels.

● STRESSPROOF No. 2 is priced lower than any other high strength Cold Finished steel bar, has 80% *the machinability of Bessemer Screw stock* . . . and worthwhile savings must result wherever it is applicable.

● Write . . . or return the coupon below . . . for descriptive booklet which will help you determine if you, too, can make savings through the use of this new steel. La Salle Steel Company, Dept. 2-D, Box 6800-A, Chicago.

La Salle STEEL COMPANY

Cold Finished Carbon and Alloy Steel Bars and Shafting—Furnace Treated Bars

WRITE FOR FREE BOOK

LA SALLE STEEL CO., Box 6800-A, Dept. 2-D, Chicago, Ill.
Please send me booklet describing your new steel STRESSPROOF No. 2.
Name_____ Title_____
Firm_____ Address_____
Also send to_____

JOHN M. COLLINS, president of the Moore Drop Forging Co., Springfield, Mass., has been made a director of the Massachusetts Mutual Life Insurance Co.

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HERMAN W. FALK, president of the Falk Corp., Milwaukee, has announced the appointment of LOUIS W. FALK as executive engineer, and W. P. SCHMITTER as chief engineer. HAROLD S. FALK, director of engineering, continues in that capacity.

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EDMUND J. BARLAND has been appointed sales manager of the Burdett Mfg. Co., Chicago, succeeding J. R. WOODFILL, who has resigned.

A. C. DYER

ANDREW G. SPIEGELHALTER, heretofore vice-president and general manager of the Pusey & Jones Corp., Wilmington, Del., has been elected president, succeeding J. P. PULLIAM, who has been elected president of the board.

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WILLIAM R. FRANCE has been made district sales representative in Minnesota with office in the Plymouth Building, Minneapolis, for the Chicago Steel Service Co., Chicago.

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JAMES P. RAUGH, who joined the sales personnel of the Pittsburgh office of General Refractories Co., Philadelphia, in 1929, has been appointed general sales manager of the company. During his connection with the company he has been district sales manager of the Detroit and Cleveland offices and during the past three years has been assistant general sales manager. FRED M. MILLER, who has been chief engineer since 1924, has been appointed general works manager. Prior to joining the company, he had been for nine years in the engineering and operating divisions of the coke oven departments of Youngstown Sheet & Tube Co., Colorado Fuel & Iron Corp., American Coke & Chemical Co., and the St. Louis Coke & Iron Co. A. C. SHAPE has been made acting chief engineer to succeed Mr. Miller.

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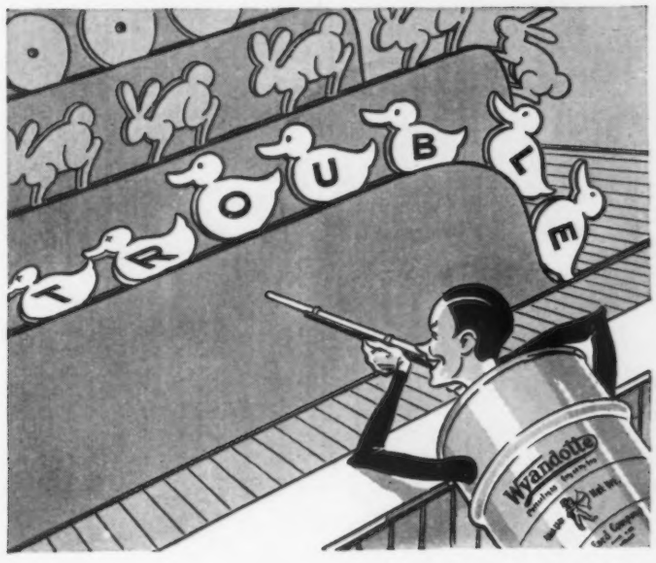
WILLIAM H. WINTERROWD has been elected vice-president in charge of operations of the Baldwin Locomotive Works, with headquarters at Eddystone, Pa., effective Feb. 15. He was graduated from Purdue University as a mechanical engineer in 1907 and has been identified with railroad work all his business life. After serving

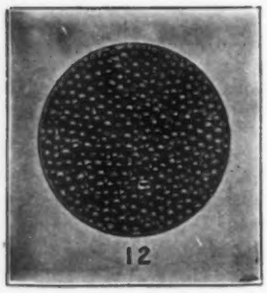


WYANDOTTE STOPS 'EM DEAD!

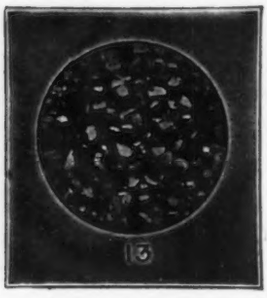
The man who works with metal expects troubles to pop up as regularly as mechanical ducks at a shooting gallery. In the department of metal cleaning and finishing, each new job presents a separate problem which no general formula will fit.

For more than a third of a century Wyandotte has been *solving* metal cleaning problems. In metal finishing plants all over the country Wyandotte men are recognized as "trouble shooters." Whether your metal cleaning problem is simple or complex, heavy production or not, your Wyandotte Service Representative will be glad to think your problem through with you.

THE J·B·FORD COMPANY
WYANDOTTE MICHIGAN
DISTRICT OFFICES IN 26 CITIES



SHOT



GRIT

Saving 10 per cent

Saving 15 per cent

Saving 25 per cent

These are the statements made to us and our representatives in all parts of the country from Concerns who are today using our Heat-Treated Shot and Steel Grit. Our list of regular customers reads like the blue book of the Automotive, Grey Iron, Malleable Iron and Drop Forging Companies. Our heat-treating insures the customer shot and grit tough and strong, and of uniform quality the year round. The test is in the machine.

Test it and be convinced.

Any size of shot or grit, a ton, or a carload, promptly shipped.

HARRISON ABRASIVE

Corporation

MANCHESTER, NEW HAMPSHIRE

We Never Compromise With Quality

with the Lake Shore & Michigan Southern Railway in various capacities, he was made mechanical engineer of the Canadian-Pacific Railroad in 1912 later becoming assistant chief mechanical engineer and chief mechanical officer of that railroad. In 1923 he joined the Lima Locomotive Works as assistant to the president and in 1927 became vice-president. Since 1934 he has been vice-president of the Franklin Railway Supply Co.

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JOSEPH F. HEIL, since 1931 vice-president of the Heil Co., Milwaukee, has been elected executive vice-president of the company, and GEORGE W. KUHLMAN, manager of the Eastern factory at Hillside, N. J., has been elected a vice-president.

After his graduation from Northwestern University, Mr. Heil, who is the son of Gov. Julius P. Heil of Wisconsin, joined the Heil Co. on a full time basis. He began at the bottom and worked up through the various departments of the company.

Mr. Kuhlman began his business career with the Heil Co. in 1919, first working in the factory and later being transferred to the sales department. When the company expanded its factory branch activity, Mr. Kuhlman was placed in charge of the Philadelphia branch and later of the New York office. He was next made Eastern district manager and general manager of the Eastern factory when that plant was acquired by the company.

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V. H. DIETRICH, vice-president in charge of operations of the special order department of Joseph T. Ryerson & Son, Inc., Chicago, has been elected a director of the American Institute of Steel Construction, Inc., to serve until the next annual meeting of the institute.

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WILLIAM H. FOGARTY, who has spent 27 of his 30 years with the Chicago office of Johns-Manville, has been transferred from the Chicago district managership of the power products department to assistant to the vice-president of the J-M. Sales Corp. He will continue to make his headquarters in Chicago. He will be succeeded as district manager by CORYDON H. HALL, who for the last three years has been assistant sales manager in the company's New York power products district.

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RAY B. HOOVER has been elected president, Shafer Bearing Corp., 35 East Wacker Drive, Chicago. Mr. Hoover was formerly vice-president and general manager of the company.

J. F. HEIL

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S. WILEY WAKEMAN has been elected a director of the Bethlehem Steel Corp. He is a vice-president of the Bethlehem Steel Co., and has been in charge of Bethlehem's shipbuilding activities since 1926.

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ARTHUR J. WILLIAMSON has been added to the technical staff of Summerill Tubing Co., Bridgeport, Pa., as metallurgical engineer in charge of research and development. After graduating from Lehigh University with a B.S. degree, Mr. Williamson continued his work and received his M.S. in metallurgy in 1933, staying on another year as instructor in metallurgy. His first commercial work was with J. G. Brill Co., Philadelphia, and during the last four years has been research metallurgist at John A. Roebling's Sons Co., Trenton, N. J.

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R. C. PURDY has been appointed manufacturer's sales agent to handle the line of industrial lighting fixtures made by the Goodrich Electric Co., Chicago. He will maintain headquarters at 13515 Lake Shore Boulevard, Cleveland.

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GEORGE R. SCOTT, president, Cone Worm Gear Corp., and gear consultant, Michigan Tool Co., is to address the February meeting of the Association of Iron and Steel Engineers in Detroit on Feb. 14 on "The Evolution

G. W. KUHLMAN

of Worm Gearing, Culminating in the Cone Design."

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C. W. FRANZ, graduate of Phillips Exeter Academy and Sheffield Scientific School of Yale, has been added to the sales staff of Acheson Colloids Corp., succeeding T. P. HUNT. Mr. Franz will do sales development work in Illinois territory from his headquarters at 330 North Michigan Avenue, Chicago.

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C. I. PACKER, president of the Packer Machine Co., Meriden, Conn., has been elected president of the Meriden Manufacturers' Association.

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L. M. KIRK has been appointed superintendent of mold preparation in the open hearth and central mills division of Gary works, Carnegie-Illinois Steel Corp. Mr. Kirk's experience in the steel industry began in 1927 when he was employed as assistant master mechanic at the Johnstown plant of the Bethlehem Steel Co. After serving there in various capacities until 1936 he went to the Worth Steel Co. as assistant open hearth superintendent, where he remained until his employment at Gary works at this time.

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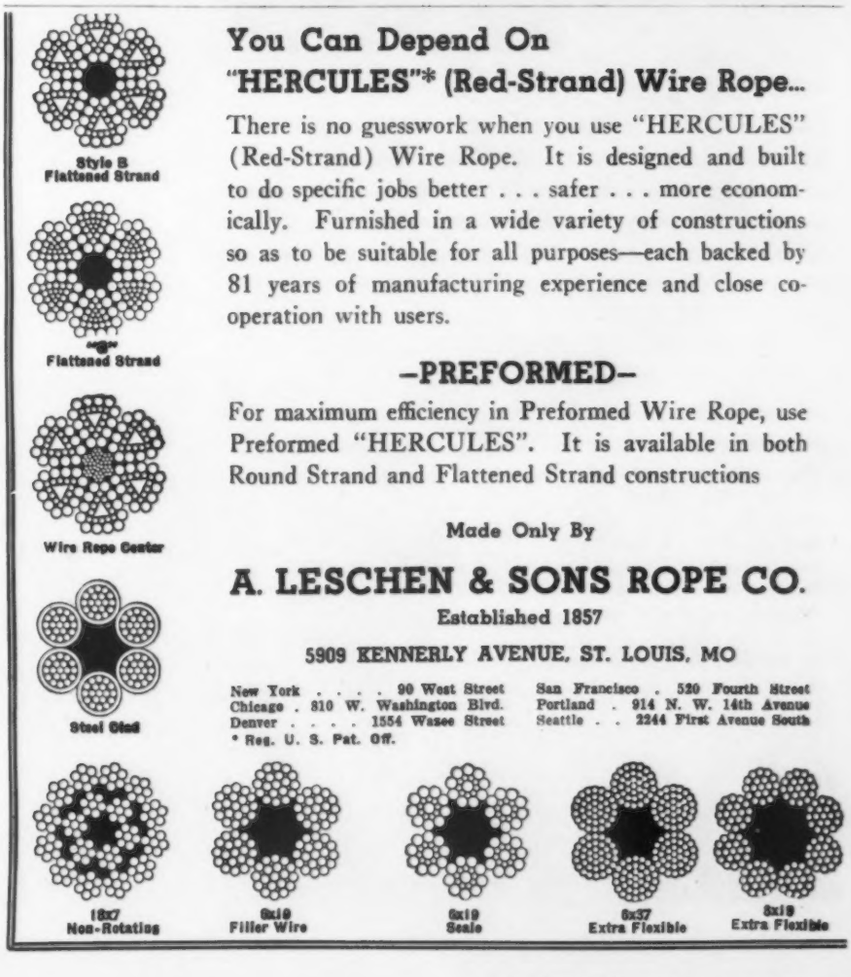
ARTHUR R. HEISE, for several years chief engineer of the Wm. Schollhorn Co., New Haven, Conn., has been appointed general manager of that company. HERBERT MEINSEN, who has complete charge of production of the many kinds of pliers and plier action tools made by the company, is closely associated with Mr. Heise. HARRY ZIEGLER, in addition to his duties as

SPRINGS
FOR EVERY MECHANICAL NEED
COIL SPRINGS
FLAT SPRINGS
WIRE SPECIALTIES
WIRE FORMS
Many manufacturers have found that they can get best results by combining their own expert knowledge of their products, with the specialized spring knowledge of America's experienced spring engineers. Let's co-operate with you.
SNAP RINGS
LOCK SPRINGS
SPECIAL SPRINGS
from Every Type of Wire up to & including ½ dia.
Send for Quotations
AMERICAN SPRING
AND MANUFACTURING CORPORATION
PARK AVE. HOLLY MICHIGAN


Style B Flattened Strand
"S" Flattened Strand
Wire Rope Center
Steel Clad
18x7 Non-Rotating
6x19 Filler Wire
6x19 Seale
6x37 Extra Flexible
8x19 Extra Flexible
You Can Depend On
"HERCULES"* (Red-Strand) Wire Rope...
There is no guesswork when you use "HERCULES" (Red-Strand) Wire Rope. It is designed and built to do specific jobs better . . . safer . . . more economically. Furnished in a wide variety of constructions so as to be suitable for all purposes—each backed by 81 years of manufacturing experience and close co-operation with users.
–PREFORMED–
For maximum efficiency in Preformed Wire Rope, use Preformed "HERCULES". It is available in both Round Strand and Flattened Strand constructions
Made Only By
A. LESCHEN & SONS ROPE CO.
Established 1857
5909 KENNERLY AVENUE, ST. LOUIS, MO
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San Francisco . 520 Fourth Street
Portland . 914 N. W. 14th Avenue
Seattle . . 2244 First Avenue South
* Reg. U. S. Pat. Off.

purchasing agent, will assist in the development of sales.

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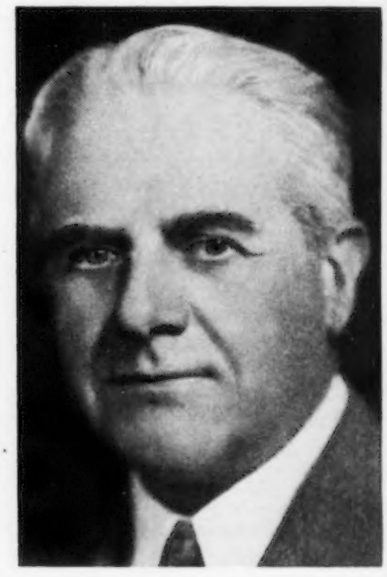
H. E. LEWIS, chairman of the board and president, Jones & Laughlin Steel Corp., has been reelected president and treasurer of the Pittsburgh Convention and Tourist Bureau, Inc. JOSEPH DILWORTH, Westinghouse Electric & Mfg. Co., was named third vice-president.

The following steel and industrial executives were also made members of the board of directors of the Pittsburgh Convention and Tourist Bureau: FRANK R. FROST, president, Superior Steel Corp.; H. A. GIDNEY, vice-president, Gulf Oil Corp.; T. J. GILLESPIE, JR., secretary-treasurer, Lockhart Iron & Steel Co.; CHARLES A. ROWAN, chairman, Westinghouse Airbrake Co.; CHARLES J. GRAHAM, vice-president, Pressed Steel Car Co.; JOHN P. HOELZEL, vice-president, Pittsburgh Screw & Bolt Corp.; LORENZ IVERSON, president, Mesta Machine Co.; GEORGE T. LADD, chairman, United Engineering & Foundry Co.; FRANK J. LANAHAN, president, Fort Pitt Malleable Iron Co.; HERBERT A. MAY, vice-president, Union Switch & Signal Co.; W. F. MORRIS, JR., vice-president, Weirton Steel Co.; H. M. REED, president, Standard Sanitary Mfg. Co.; HENRY A. ROEMER, president, Pittsburgh Steel Co.; E. T. WEIR, chairman, National Steel Corp.; J. T. TIERNEY, president, Koppers Co.; B. F. FAIRLESS, president, United States Steel Corp.; WILLIAM P. WITHEROW, president, Blaw-Knox Co.; J. LESTER PERRY, president, Carnegie-Illinois Steel Corp.; C. M. YOHE, vice-president, Pittsburgh & Lake Erie Railroad; J. D. BERG, chairman, Dravo Corp.; J. F. CASEY, president, Swindell-Dressler Co.; and GORDON FISHER, chairman, Spang Chalfant Co.



THOMAS DREVER, new president of American Steel Foundries, whose appointment was announced in these columns last week.

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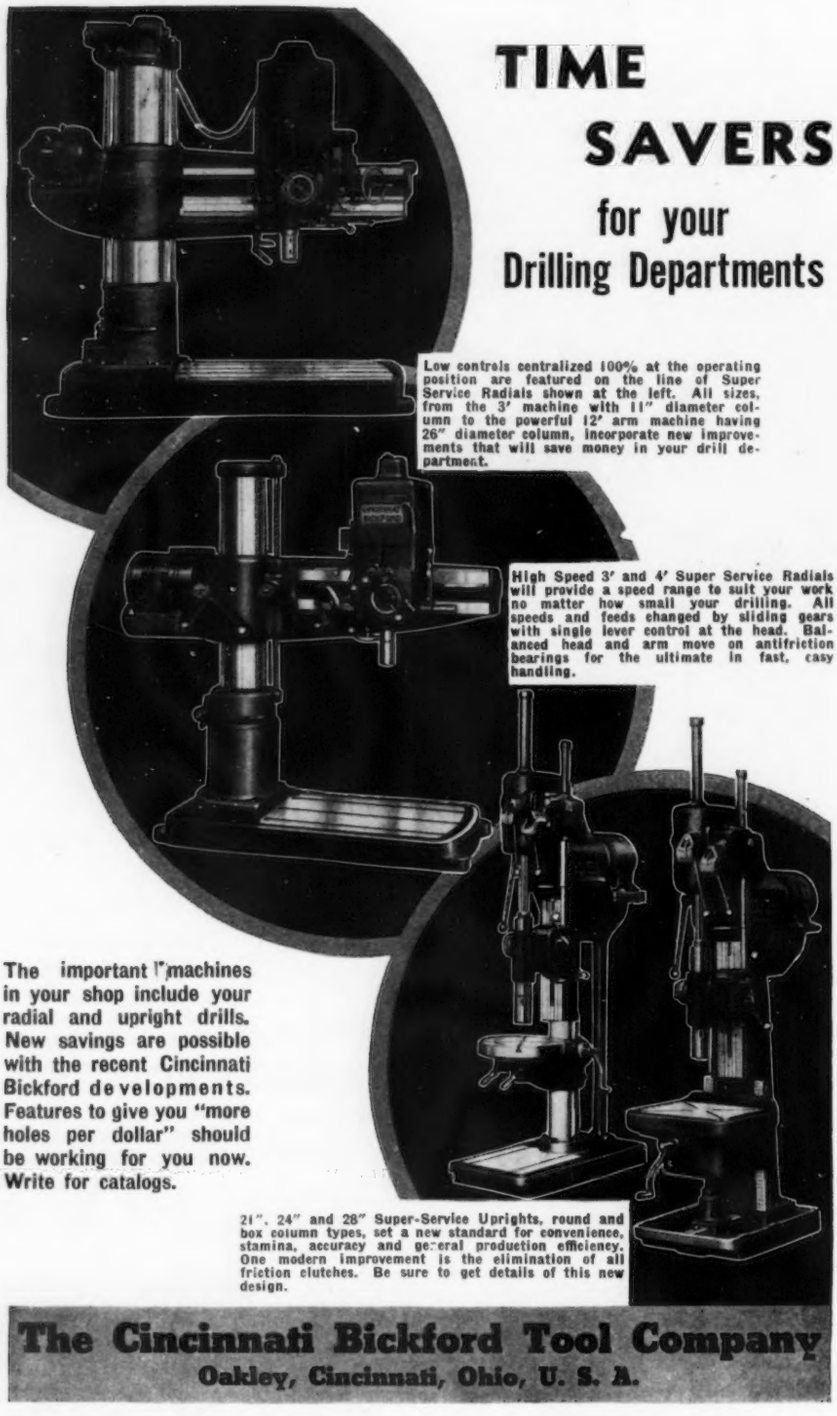
M. P. LEWIS, former Eastern district manager of wire sales for the United States Rubber Co., has been appointed assistant manager of the wire sales department, New York. H. H. WEBER has been appointed commercial engineer of that department. H. J. MACDONALD becomes manager, wire sales, for the Eastern district and will be succeeded in New England by C. W. SHORT.


TIME
SAVERS
for your
Drilling Departments
Low controls centralized 100% at the operating position are featured on the line of Super Service Radials shown at the left. All sizes, from the 3' machine with 11" diameter column to the powerful 12' arm machine having 26" diameter column, incorporate new improvements that will save money in your drill department.
High Speed 3' and 4' Super Service Radials will provide a speed range to suit your work no matter how small your drilling. All speeds and feeds changed by sliding gears with single lever control at the head. Balanced head and arm move on antifriction bearings for the ultimate in fast, easy handling.
The important machines in your shop include your radial and upright drills. New savings are possible with the recent Cincinnati Bickford developments. Features to give you "more holes per dollar" should be working for you now. Write for catalogs.
21", 24" and 28" Super-Service Uprights, round and box column types, set a new standard for convenience, stamina, accuracy and general production efficiency. One modern improvement is the elimination of all friction clutches. Be sure to get details of this new design.
The Cincinnati Bickford Tool Company
Oakley, Cincinnati, Ohio, U. S. A.

. . . OBITUARY . . .

DR. ALBERT SAUVEUR, professor emeritus of metallography and metallurgy at Harvard University and one of the greatest authorities on the modern science of metallography, died at a Boston hospital on Jan. 26.

Dr. Sauveur was born in Louvain, Belgium, June 21, 1863. An expert on iron and steel, his advice was often sought by the United States and foreign governments. He won special honorary awards from France and Belgium; and during the World War was metallurgist on the American Aviation Commission in France and metallurgical expert to the French Ministry of munitions. As a result of his experiences during the War he wrote "Germany and the European War" and "Germany's Holy War."

DR. ALBERT SAUVEUR

His formal education was obtained in Belgium schools, including mining, and the Massachusetts Institute of Technology, where he received an S.B. degree in mining and metallurgy in 1889. Dr. Sauveur joined the Harvard faculty that same year as instructor in metallurgy; became a full professor in 1905, and professor emeritus in 1935. He was an active member of a number of scientific and technical societies. In 1924 he received the Bessemer gold medal of the Iron and Steel Institute of Great Britain and 10 years later was the first recipient of the Albert Sauveur Achievement Medal of the American Society for metals.

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JAMES T. STORMONT, for many years superintendent of the Hodge Boiler Works, East Boston, died on Jan. 22 at the home of his son in Chelsea, Mass. He was 70 years old.

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WILLIAM P. KENNEY, president, Great Northern Railway, died last week in St. Paul, aged 69 years. Mr. Kenney had spent his entire life in the railroad business, starting at 18 as a telegraph operator for the Chicago Great Western. A year later he became chief clerk in the general freight office of the St. Paul and Duluth, now part of the Northern Pacific, and three years hence went to the Great Northern as clerk in the general freight office. In 1912 he was made vice-president in charge of traffic and later vice-president and director of traffic, which position he

Dependable Low-Cost Handling Aids Machine Production

This 10-ton Tiger crane supplies the dependable overhead handling so essential to efficient production in machine shops and metal-working plants. It is one of many hundreds of Tiger cranes that so effectively provide daily overhead transportation in busy shops at the very lowest operating cost, due to roller bearings and herringbone "speed-reducer" gear units running in oil bath and protected against dirt and undue wear. Modernize with a Tiger in 1939.

Send for Bulletin 300

WHITING CORPORATION, 15601 Lathrop Ave., Harvey, Ill.

WHITING

PIONEERS SINCE 1884

held until he succeeded RALPH BUDD, now president of the Burlington road, as president of the Great Northern.

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RICHARD B. SHERIDAN, former president Brown Hoisting Machinery Co., and later an officer of the Allied Machinery Co., the American International Corp. and the New York Air Brake Co., all of New York, died at his residence in Ossining, N. Y., Jan. 21. He first served the Brown Hoisting Machinery Co. as representative in Russia, later assuming the responsibilities of traveling representative for all of Europe. Returning to Cleveland in 1906 he was made general manager and later was elected president.

❖ ❖ ❖

WILFRED STRONG, treasurer of Kalamazoo, Foundry & Machine Co., Kalamazoo, Mich., was instantly killed when his car was struck by a fast passenger train of the Michigan Central Railroad on Jan. 25. Strong had been associated with the foundry and machine company for the last 35 years.

P. J. WARD, works manager of the American Steel Foundries, whose death was announced in these columns last week.

❖ ❖ ❖

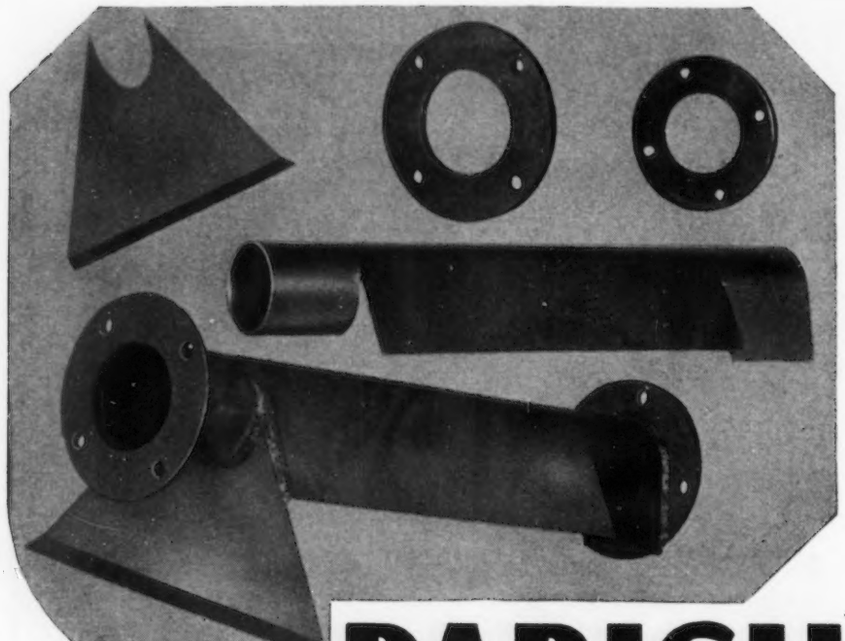
WILLIAM SHERWOOD, president of the Sherwood Brass Works and one of its founders, was buried Jan. 23 at Detroit. Mr. Sherwood was born in Lincolnshire, England, in 1851 and had lived in Detroit 68 years. He started in business in 1893 as the Buick Sherwood Mfg. Co., with David Buick, founder of the Buick Motor Car Co. as a partner.

❖ ❖ ❖

STANFORD T. CRAPO, former general manager of the Pere Marquette Railroad and long a leader in the industrial and financial life of Michigan, died Jan. 26 in Tryon, N. C. He was a graduate of Yale University in the class of 1886.

❖ ❖ ❖

JOHN MARSHALL LOCKHART, chairman of the board of directors of the Lockhart Iron & Steel Co., Pittsburgh, for about 25 years, died Jan. 23 at his home in Pittsburgh. Mr. Lockhart was also a director of the Alpha Portland Cement Co., Westinghouse Airbrake Co., Mellon National Bank, Union Trust Co., and Union Savings Bank. His father was one of the founders of the Lockhart Iron & Steel Co. He was 73 years old.



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Simple or complicated, straight from the press or built up by additional operations, whatever your needs . . . Parish can be of service. Parish men know metal habits, and how to bend these tough materials to their will—*and yours*.

We ask an opportunity to discuss your requirements with you. A representative will call at any time you suggest.

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READING, PA.
PACIFIC COAST REPRESENTATIVE, F. Somers Peterson Co., 57 California St., San Francisco, Cal.

C. WOOD WALTER, formerly vice-president of the Cincinnati Milling Machine Co., who, as announced in these columns last week, died on Jan. 16.

JOHN J. CORCORAN, treasurer of Detroit Metal Spinning Co., died Jan. 16.

❖ ❖ ❖

CLARENCE M. BOOTH, member of the Traffic Club of Detroit and traffic manager of the Pere Marquette Railroad in Detroit since 1929, was buried Jan. 14 in Detroit.

❖ ❖ ❖

FRANK YOST, one of the founders of the Lucas Machine Tool Co., Cleveland, died early this month at his home in East Cleveland, Ohio, following an illness of several months. The company started as a partnership on Jan. 1, 1900. Mr. Yost was a lifelong resident of Cleveland and retired about 15 years ago. He is survived by two sons, Frank L. and George A. Yost, the latter secretary of the Lucas Machine Tool Co.

Sterling Motor Truck Co., Inc., Milwaukee, has acquired the assets of the truck division of the **Fageol Truck & Coach Co.**, Oakland, Cal. The division has been moved to San Francisco. The Sterling company has also taken over the repair parts business of the Fageol on a consignment basis.

The Industrial Division of Wailes Dove-Hermiston Corp., New York, has appointed Robinson, Cary & Sands Co., St. Paul, Minn.; Stokes, Engineering & Supply Co., Easton, Pa.; Strong, Carlisle & Hammond Co., 1392 West 3rd Street, Cleveland, and the C. W. Marwedel Co., 1235 Mission Street, San Francisco, as distributers of the Bitumastic line of maintenance protective coatings.

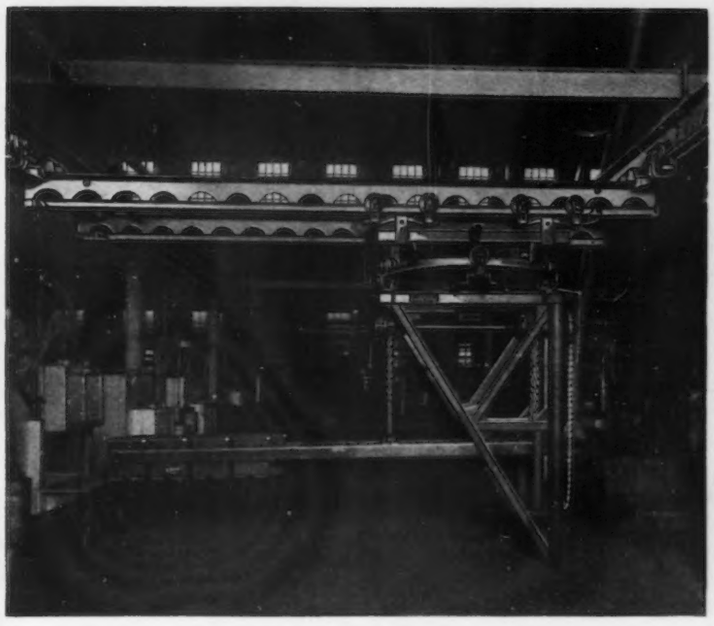
Bethlehem 1938 Income $5,250,239; No Pay "Chiseler," Grace Says

ANSWERING critics whom he said had accused his corporation of being a "wage chiseler" and protesting that the Department of Labor had not adhered to the intent of the law in setting base rates for steel workers employed in executing Government contracts, Eugene G. Grace, president of Bethlehem Steel Corp., last week discussed the problems of the steel industry following the release of the corporation's fourth quarter income report.

The earnings report revealed that net income for the period was $3,658,160, equal to 56c. a common share. In the previous quarter net earnings were $446,866 and in the fourth quarter of

CLEVELAND TRAMRAIL

OVER HEAD HANDLING EQUIPMENT



● For heat treating furnace charging, Cleveland Tramrail has developed several types of equipment. This one is rotating. Cold Heat Treatment Pots are picked up from the roller conveyor; the charging unit rotated 180 degrees; the complete unit is then lined up with the proper furnace door and locked into position. Hot charges are returned to another conveyor line by reverse motion.

ALSO BUILDERS OF CLEVELAND CRANES ALL WELDED

CLEVELAND TRAMRAIL

DIVISION OF THE CLEVELAND CRANE & ENGINEERING CO.

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1937 were $4,253,329. For the year 1938 net earnings were $5,250,239 as against $31,819,596 in 1937. The regular quarterly dividends of $1.75 a share on the 7 per cent and 25c. on the 5 per cent preferred stocks were declared.

Operations at 51%

Ingot operations, according to the report, averaged 56.5 per cent of capacity in the quarter, as compared with 46.4 in the third quarter. For the entire year operations averaged 43.3 per cent against 77.7 per cent in 1937. Current ingot output is at 51 per cent.

Questioned as to his opinion of the minimum wage scales recently set by the Department of Labor, Mr. Grace criticized the manner in which the department had arrived at the rates for the various districts, particularly the Eastern district, which the labor department interpreted as including Bethlehem's Sparrows Point plant. He said it was his opinion that the department's act was not in keeping with the wording of law (the section referred to by Mr. Grace is published elsewhere on this page). The department fixed a minimum wage scale, he contended, instead of determining the prevailing minimum wage as the law instructed.

Rebukes Wage Critics

"I am tired of hearing criticism of Bethlehem as a 'wage chiseler,'" Mr. Grace said. "Our corporation's average pay to all its employees in 1938 was 91.8c. an hour. I have no figures for U. S. Steel Corp. for the same period, but in 1937 our average was 89.1c. against 86.4c. paid by U. S. Steel.

"In every district where our plants are operating we pay top rates. U. S. Steel's vary from 45c. to 62.5c., depending on the districts. Bethlehem's rates vary from 56.5c. to 62.5c. U. S. Steel has been justly credited with having paid liberal wages in all its history."

Mr. Grace pointed out that the Maryland district, where the Sparrows Point plant is located, has a minimum wage rate of 56½c. an hour and competes with the South where the minimum is 45c. Yet, according to the minimum wage scales set by the labor department, the plant will be required to raise the base rate to 62½c. on all Government business.

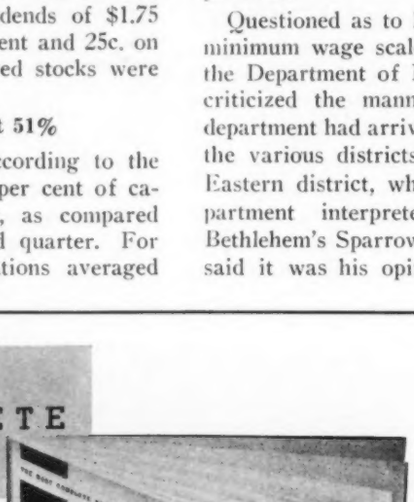
Armament Plants Busy

On the question of armaments, Mr. Grace stated that the present Navy program would occupy the company's capacity for armor plate for the next three or four years. At present the corporation's armor plate mills are working at capacity.

Discussing the trend of future steel business, Mr. Grace said he felt that the present dip was only temporary and he anticipated that the corporation's operations for the current quarter would average about 50 per cent, although the volume of incoming orders at present is equal to only 46 per cent of capacity. To substantiate his moderate optimism toward the future, he pointed out that the corporation's backlog of orders on hand Dec. 31 was $162,774,713, the highest peacetime level in Bethlehem's history. The major item in this backlog was a $50,000,000 battleship contract recently placed by the Government.

Questioned on the price weakness reported by several daily newspapers, Mr. Grace said that the market had been gradually improving in price

One COMPLETE Book



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General Purpose Bearings, Johnson UNIVERSAL Bronze Bars, Electric Motor Bearings, Johnson Graphited Bronze, Babbitt-Lead Base and Tin Base, Hexagon Bar Bronze, Oil Grooving, Alloys, etc.

JOHNSON BRONZE

Sleeve BEARING HEADQUARTERS

505 S. MILL STREET · NEW CASTLE, PA.

firmness since last October and that at present was in better shape than at any time since then. Regarding extras, he said, "The extra schedule is a movable piece, but to my knowledge there is no unusual weakness in extras."

Regarding the effect of the recent basing point changes on the industry, Mr. Grace said he did not know of any special effect it had on the smaller interests. However, he pointed out, the price reductions of last October were made by the larger integrated companies and not by the smaller interests.

Webster Mfg., Inc., Formed As a Reorganization

WEBSTER MFG., INC., Tiffin, Ohio, has succeeded to the businesses previously operated under the names Webster Mfg. Co. and Weller Mfg. Co. The predecessor companies had been operated under a trusteeship for several months. The new organization has obtained working capital and will continue in the manufacture of conveying and material handling equipment. General offices are at Tiffin, Ohio, and a staff of sales engineers will be stationed in branch offices in New York, Chicago, Buffalo, Cleveland, Cincinnati, Detroit, Philadelphia, Pittsburgh and Bloomington, Ill. K. H. Waterfield heads the reorganized company as president and general manager; W. C. Doemel is vice-president and production manager; Bert Jody, secretary; Charles S. Clarke, treasurer; C. S. Jones, chief engineer; L. A. Scheck, sales manager; L. F. Maher, purchasing agent.

NLRB is Told Poor Business Cuts Payrolls

CHICAGO—No employees of the Continental Roll & Steel Foundry Co., East Chicago, Ind., have been discharged recently because of union activity, Jay Osler, president, said in a hearing conducted by the National Labor Relations Board. The board accused the company of spying on CIO employees, threatening their jobs if they did not join a company organization, and discharging six men for union membership.

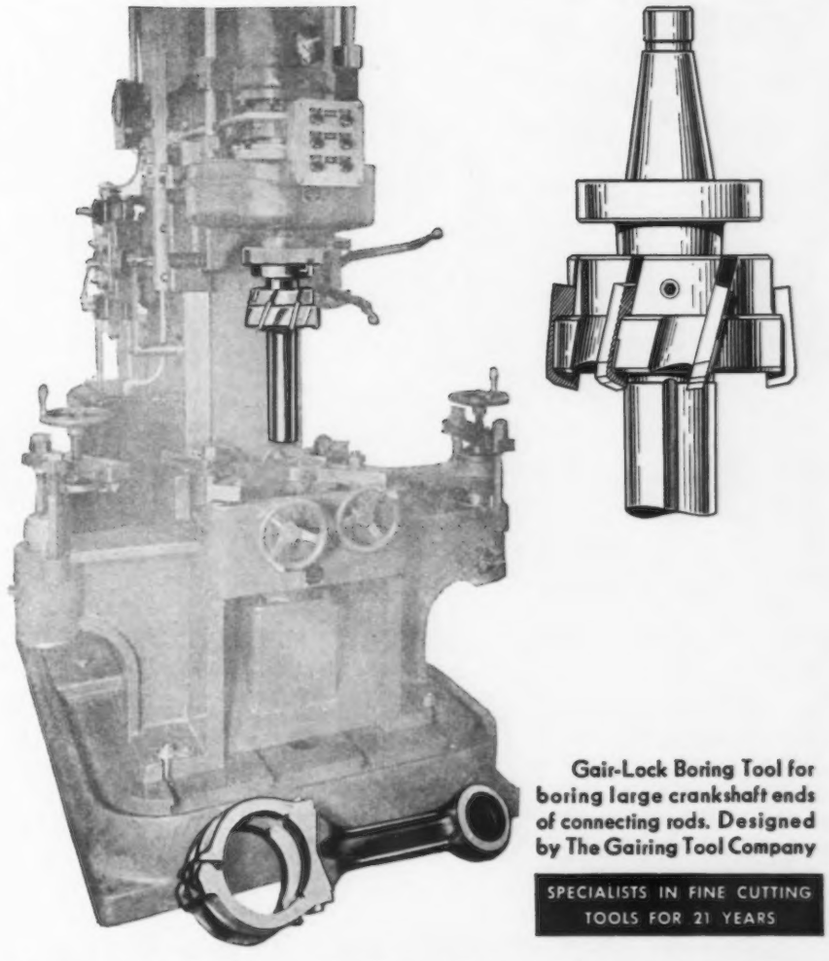
Mr. Osler said that business conditions were responsible for the reduction in number of employees from 1150 in the summer of 1937 to only 750, most of whom are on part-time today. Van A. Bittner, regional director, SWOC, brought the charges.

People Will Decide, Attorney Tells Traffic Club Gathering

BUSINESS and industry is on trial before the bar of public opinion and is partly responsible for failing to present its case to the people during the past five years, while the Government has carried on a program of condemnation against business men and private enterprise," C. Wayland Brooks, Chicago attorney, told more than 2000 leading industrial and railroad executives at the annual banquet of the Traffic Club of Pittsburgh held at Pittsburgh last week.

"It would seem Government would have more sense than to hit business on the head, but maybe industry should have more sense than to place its head on the block," Mr. Brooks said.

Tracing the means by which news and propaganda have been disseminated, Mr. Brooks pointed out that the



Gair-Lock Boring Tool for boring large crankshaft ends of connecting rods. Designed by The Gairing Tool Company

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Speed Diesel Engine Production

Gair-Lock Cutting Tools are being widely adopted for roughing, semi-finishing and finishing operations on Diesel Engine connecting rods, cylinder liners, blower housings, housing end plates and pump bodies. They combine accurate performance, volume production and long life. Write for Gair-Lock Folder 201.

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GAIRING LOCK

—the economical all-purpose blade applicable to all types of cutting tools from single point boring bars to complicated milling cutters.

press and the pulpit have always made the greatest effort to maintain complete freedom of expression.

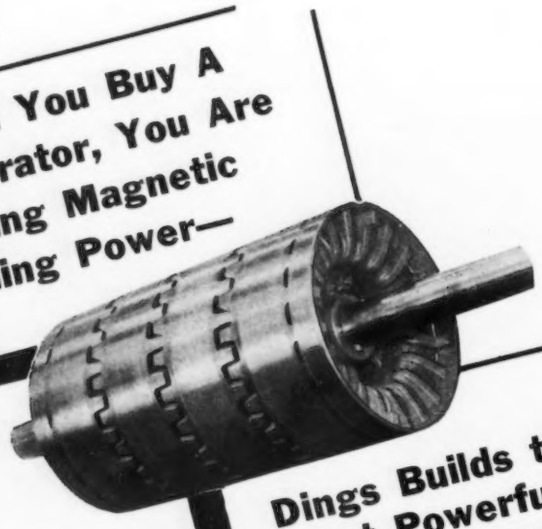
He added, "Since moving pictures and radio have become widely used, an excellent medium has been furnished for propaganda, and it is through these means of communication that as high as 31,000,000 radio sets have blared forth such expressions as 'economic royalists,' 'controlled by 200 corporations,' '60 families,' and other epithets which have had as their purpose a condemnation of American enterprise."

Pointing out the tremendous progress in production and distribution of everyday necessities and luxuries, Mr. Brooks said, "Industry has used the radio to sell its toothpaste, automobiles, furniture, and rugs, but has failed to use the same facilities to sell itself to the American public and it has itself to blame." He further emphasized that business should tell the people the true facts about the workings of industry.

"Our people can be trusted to draw the true conclusions if they know the facts and there is no race in the world which really wants to hate and pile on invectives against business or anything else if they are presented with the complete story, and in my opinion," he concluded, "you industrialists have much at stake and should lose no time doing something about it."

T. M. Girdler, chairman of the board, Republic Steel Corp., was toastmaster at the banquet, which was attended by industrialists from all parts of the United States.

When You Buy A Separator, You Are Buying Magnetic Pulling Power—



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Dings pulleys have twice the heat radiating surface of any similar pulley! That means *cooler operation* and *more power* because a hot separator won't separate.

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Dings gives you these greater savings because Dings gives you maximum iron-removal power! Write for details now.

FREE MAGNETIC ANALYSIS—
Regardless of what iron-removal method you use, send a sample of your used foundry sand to the Dings Laboratory. You may be amazed to find out how much iron is in it, how much iron can be taken out of it! No obligation. Send your sample today.

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SEPARATION HEADQUARTERS SINCE 1899

Pulverized Coal

(CONCLUDED FROM PAGE 50)

400 tons of coal per day, the total cost per ton of coal is 21c.

Explosions are Rare

At one time there was considerable discussion of explosions accompanying the use of pulverized coal. When it is remembered that 95 per cent of the cement made in this country today uses pulverized coal as a fuel, that at least 80 per cent of all public utilities are using this fuel on steam boilers, and that the copper industry uses pulverized coal for 95 per cent of heating operations, it becomes apparent that the users have learned to handle this fuel to the extent that explosions are rare.

In the writer's experience, pulverized coal is no more dangerous than any raw coal pile, and where ordinary sensible precautions are observed, there is absolutely no explosive danger. It is only necessary to keep the coal plant clean. A pulverized coal plant can be painted white and so maintained if cleanliness is the rule, because pulverized coal has the advantage that a leak is more quickly discovered than a leak in a natural gas or fuel oil system.

European Color & Chemical Co., 19th Street and Park Avenue, Weehawken, N. J., suppliers of heat treating materials to the metal industry for 25 years, has changed its name to the Ecco Chemical Corp., according to an announcement by Joseph H. Schmitt, treasurer.

Van Norman Machine Tool Co. announces that Marshall & Huschart Machinery Co., Chicago, has been appointed exclusive representative in the Chicago territory for Van Norman's line of machine tools.

Steel Awards by U. S. For Week $360,893

WASHINGTON—Contracts for iron and steel products awarded under the Walsh-Healey Act during the week ended Jan. 21 amounted to $360,893. Machinery contracts aggregated $1,239,299.01 and transportation equipment awards totaled $440,492.87. Details follow:

Iron and Steel Products

American Steel & Wire Co. of N. J., Washington, D. C., nails	Indefinite
Keystone Steel & Wire Co., Peoria, Ill., nails	Indefinite
Columbia Steel Co., San Francisco, nails	Indefinite
Baker Hamilton & Pacific Co., San Francisco, nails	Indefinite
J. K. Larkin & Co., Inc., Woodside, L. I., N. Y., nails	Indefinite
Otis Elevator Co., Buffalo, steel castings	$14,070.32
The Simes Co., Inc., New York, sand jars	Indefinite
Truscon Steel Co., New York, steel sash	22,927.00
Republic Steel Corp., Canton, Ohio, metal pipe	10,904.96
Carnegie-Illinois Steel Corp., Philadelphia, manganese bar steel	107,600.00
Bethlehem Steel Co., Los Angeles, reinforcing steel	56,824.54
Koppers Co., Bartlett-Hayward Div., Baltimore, gates and units	35,000.00
Koppers Co., Bartlett-Hayward Div., Baltimore, gates and units	54,000.00
John A. Roebling's Sons Co. of Calif., Los Angeles, cable	12,414.48
Kittle Mfg. Co., Los Angeles, practice bombs	10,086.60
Lukenweld, Inc., Coatesville, Pa., base ring weldments	37,065.00

Non-ferrous Metals and Alloys

Aluminum Co. of America, Washington, D. C., aluminum alloy	582,300.00

Other Machinery

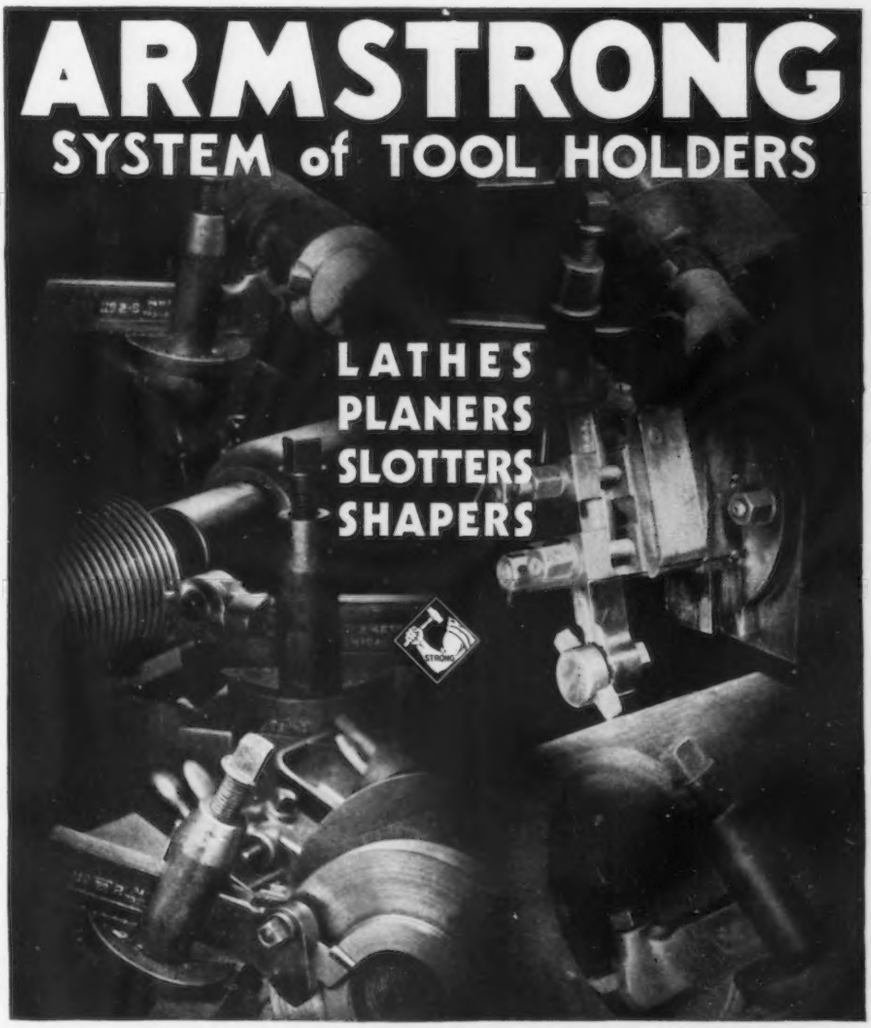
L. J. Wing Mfg. Co., New York, fans	10,836.00
Ilg Electric Ventilatiing Co., Chicago, fans	36,967.20
Chas. F. Elmes Engineering Works, Chicago, accumulator	27,300.00
Ex-Cell-O Corp., Detroit, engine parts	144,038.60
Skinner Engine Co., Erie, Pa., steam engine	66,485.00
The Carborundum Co., Niagara Falls, N. Y., wheels, abrasive	30,000.00
General Machinery Corp., Niles Tool Works Div., Hamilton, Ohio, planer	143,225.00
Wm. Sellers & Co., Inc., Philadelphia, planers	279,100.00
The Hydraulic Press Mfg. Co., Mount Gilead, Ohio, presses	74,000.00
Jones & Lamson Machine Co., Springfield, Vt., grinder	18,962.86
Cincinnati Milling Machine & Cincinnati Grinders Inc., Cincinnati, milling machines	55,004.75
Jones & Lamson Machine Co., Springfield, Vt., spindle machine	16,463.00
The Bullard Co., Bridgeport, Conn., chucking mach.	35,585.60
H. R. Krueger & Co., Detroit, drilling mach.	32,330.00
Bay City Shovels, Inc., Bay City, Mich., excavator	10,825.00
Bennett & Taylor, Los Angeles, gasoline storage and dispensing system	34,039.00
Caterpillar Tractor Co., Peoria, Ill., patrol graders	19,605.00
Caterpillar Tractor Co., Peoria, Ill., motor grader	12,276.00
Crane Co., Norfolk, Va., valves	15,548.25
Sunroc Spring Water Co., Media, Pa., water coolers	61,855.00
Imperial Machine & Foundry Corp., Lindenhurst, L. I., N. Y., potato peelers	16,182.50
The Hobart Mfg. Co., Troy, Ohio, dish washers	88,710.25
The Cincinnati Time Recorder Co., Cincinnati, meat slicers	9,960.00

Electrical Apparatus and Supplies

Palmer Electric Co., Seattle, cable and wire	$18,214.89
Graybar Electric Co., Inc., N. Y. C., cable and reels	22,946.28
Electric Arc Cutting & Welding Co., Newark, generating units	129,270.00
Pittsburgh Lectromelt Furnace Corp., Pittsburgh, furnace	33,242.00
The Allen D. Cardwell Mfg. Corp., Brooklyn, frequency meter set	200,450.00
Moloney Electric Co., St. Louis, power transformers	20,566.00
The Emerson Elec. Mfg. Co., St. Louis, elec. fans	13,741.00
Robbins & Myers, Inc., Springfield, Ohio, elec. fans	267,325.00

Transportation Equipment

Fargo Motor Corp., Detroit, automobiles	$19,599.50
General Motors Corp. (Chev. Div.), Detroit, cars	14,964.67
International Harvester Co., Inc., Washington, D. C., trucks	10,488.00
Fargo Motor Corp., Detroit, trucks	328,830.00
The Timken Detroit Axle Co., Detroit, electro. transmission	10,000.00
Wisconsin Axle Co., Oshkosh, Wis., transmissions	46,430.70
The Baker-Raulang Co., Cleveland, truck	10,189.00



Have you the right ARMSTRONG TOOL HOLDERS for machining today's tougher steels?

The newer, tougher alloy steels need offer no unusual machining problems, for there are ARMSTRONG TOOL HOLDERS especially designed to handle them. The ARMSTRONG Spring Cutting-off Tools have a "goose-neck" form and resiliency that prevents work from climbing up on the cutter, prevents excess tool breakage, and makes cutting-off an ordinary instead of an extraordinarily expensive operation. Other ARMSTRONG TOOL HOLDERS, that every shop working in tough alloy steel should have, are the Spring Threading Tool and the new ARMSTRONG Carbide TOOL HOLDERS. Equipped with Armide (Carbide Tipped) Cutters, these "carbide" Tool Holders will machine hard steels without annealing, will go as much as 50 times as long without re-grinding.

It is a sound policy whenever faced with a difficult cutting problem to first look in the ARMSTRONG catalog, for there you will find efficient cost-cutting tools for every operation on lathes, planers, slotters, and shapers.

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Buy ARMSTRONG TOOLS from your Supply House

. . . THE NEWS IN BRIEF . . .

Village of steel houses will be built by 60 American Rolling Mill Co. employees near Middletown, Ohio.—**Page 57.**

Weirton Steel Co. holds dinner for friends and customers, with every item on menu "coming from cans."—**Page 57.**

Goodyear Tire & Rubber Co. will celebrate its 40th anniversary and 100th anniversary of Charles Goodyear's discovery of vulcanization on Feb. 20-23.—**Page 57.**

Auto Show month earlier than last year may alter buying plans—Production maintains contra-seasonal level, totaling 89,200 units last week—General Motors sets industrial safety record—Willys officials organize aircraft concern at Toledo.—**Page 58.**

Measures to tighten Public Contracts Act are introduced in Congress; law may affect orders over $2,000.—**Page 62.**

AFL submits its design for living under an improved Wagner Act with proposal for amendments to that controversial law.—**Page 62.**

LaFollette Committee prepares legislation permitting "self-protection" of plants but aimed to prohibit employment of strikebreaking organizations.—**Page 65.**

Assistant Attorney General Arnold modifies the first FTC questionnaire sent to steel manufacturers.—**Page 66.**

Missouri Congressman introduces resolution calling for 10-man committee from House to investigate the Labor Board.—**Page 68.**

Production of harvester-thresher units in the United States during 1938 gained 63 per cent in value over the 1937 total.—**Page 68.**

Bureau of Standards reports method developed by shelving manufacturer for counting previously applied coats of paint.—**Page 69.**

Exports of aluminum and aluminum products in 1938 were valued at $6,483,695, or more than 60 per cent above 1937 total.—**Page 69.**

Consolidated Steel Corp. will provide pipe for Heart Mountain canal siphons.—**Page 70.**

Business awaits speech by Harry L. Hopkins to learn of Administration's "era of good feeling" toward business.—**Page 70.**

Eugene G. Grace answers critics of Bethlehem wage scales; company reports net profit of $3,658,160 in fourth quarter of 1938.—**Page 81.**

Poor business conditions caused Continental Roll & Steel Foundry Co., East Chicago, Ind., to reduce its payrolls, NLRB is told.—**Page 83.**

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MEETINGS

Feb. 9 to 11—Conference of iron, steel and allied industries, Del Monte, Cal.

Feb. 14 to 17—Purchasing Agents Association, Indianapolis.

March 14 to 18—American Society of Tool Engineers, Detroit.

March 16 and 17—Society of Automotive Engineers, Washington.

April 10—Industrial Marketers of Cleveland.

Industry should protect itself against Government condemnation, Chicago attorney tells 2000 at Pittsburgh Traffic Club banquet.—**Page 83.**

Webster Mfg. Inc., maker of material handling equipment, is formed by reorganization of companies at Tiffin, Ohio.—**Page 83.**

Walsh-Healey Act contracts for iron and steel products in latest reported week total $360,892.—**Page 85.**

Simonds Saw & Steel Co.'s new windowless factory at Fitchburg, Mass., will be completed by March 1.—**Page 88.**

Charles R. Hook criticizes, J. Warren Madden defends National Labor Relations Act in radio debate.—**Page 90A.**

American Society of Mechanical Engineers publishes manual covering standards of design and construction of time-series charts.—**Page 90D.**

California steel men will meet Feb. 9-11 at Del Monte for the 15th annual iron and steel conference. **Page 90D.**

Spicer Mfg. Corp. works with United Automobile Workers on plan for stabilizing employment.—**Page 90D.**

American Helicopter Corp. is organized at Toledo by interests affiliated with Willys-Overland.—**Page 90D.**

Bureau of Standards experts reveal method of computing expansivity of enamels.—**Page 90D.**

Seventy-four hulls, with a total tonnage of 40,498, were built by Dravo Corp. during 1938.—**Page 110.**

Welding Research Committee of the Engineering Foundation announces a $100,000 program of welding research.—**Page 110.**

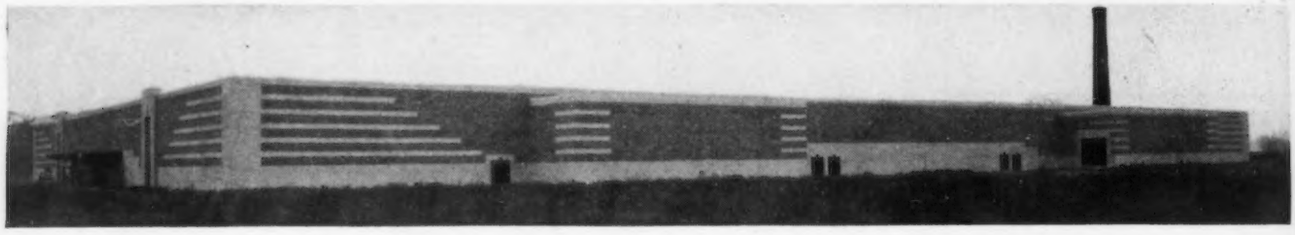
Cincinnati machine tool builders report moderate increase in domestic orders—Undertone continues strong in other centers.—**Page 116.**

A. W. Cadman Mfg. Co., Pittsburgh, is licensed by Westinghouse Electric & Mfg. Co. to produce Cupaloy castings.—**Page 90.**

Effective date of the Department of Labor's steel wage minimums is postponed from Jan. 31 to March 1.

Ohio Ferro-Alloys Corporation
Canton, Ohio

FIVE-ACRE windowless plant of the Simonds Saw & Steel Co., at Fitchburg, Mass., now nearing completion. There are only 56 intermediate columns in the entire structure, which will accommodate operations carried on in three old plants, with an acre to spare.



Simonds Saw Windowless Factory Nearing Completion

THE new plant of the Simonds Saw & Steel Co., at Fitchburg, Mass., designed and built by the Austin Co., Cleveland, will be completed by March 1 and will be equipped, it is expected, by June 15.

It provides a single windowless room five acres in area (361 x 561 ft.) in which operations previously carried on in three old plants comprising 17½ acres will be accommodated. There are only 56 intermediate columns in the entire structure, which has eight 70-ft. aisles with column supports every 40 ft. Structural steel for the building, 1020 tons of it, was entirely shop welded. It includes special jack trusses which support intermediate roof sections in these large bays. The roof is of special design which provides maximum insulation and minimum weight. The underside of the ceiling is of perforated metal of hollow rib design, into which slab cork has been placed. This, in turn, is covered by two ½-in. layers of insulated board, and the entire roof is topped by a bonded waterproofing.

Service facilities, including coat rooms, wash rooms and lavatories, as well as air conditioning units, are located in four lean-to buildings which extend out from the side walls of the building.

The outer walls are composed of buff-colored face brick, arranged in a design with contrasts which emphasize the horizontal sweep of the entire structure. A dead air space has been provided between the outer and inner wall which is of acoustic type cinder block.

Shadowless Lighting Provided

Daylight is completely excluded by the solid walls which permit complete control of illumination without any variation day or night the whole year round. Lighting fixtures of new type providing 50 lumens of light per watt are being installed at 1440 positions throughout the plant. The fixtures, each of which consists of a 1000-watt tube and a simple curved porcelain reflector, will be mounted 16 ft. above the working floor and will provide uniform shadowless illumination of 20 footcandles or better throughout the room. With a lighting efficiency said to be almost double that of the types previously available, and an accessibility that will facilitate maintenance, these fixtures will be an outstanding feature of the plant.

Nine major production lines extending the length of the plant will be set up with all service lines, including water, gas, steam, power, light, air and oil carried direct to more than 1000 machine and furnace locations. A 4-ft. steel walkway suspended from the trusses will permit observing operations throughout every portion of the plant.

The more than 38,000 ft. of piping

NORTH section of Simonds windowless plant. Lighting fixture of new type will provide uniform shadowless illumination, and all dust and exhaust gases will be removed at their sources through an underground network of ducts. Some of the dust removal units may be seen in the background. Delivery of power, water, gas, oil, etc., to each machine through permanent under floor lines is also a feature.

required in the factory is almost evenly divided between underground locations and overhead installation in the roof trusses all alongside the columns. Special power ducts totaling 17,000 lineal feet were installed on 10-ft. centers throughout the plant and have access openings every 2 ft. They are equipped with 280 standard and 265 special splice boxes. The installation of galvanized iron conduit totaled 60,500 ft., whereas 177,000 ft. of wire and cable were required.

The plant has a connected power load of 6000 hp. and a total of 4200 electric outlets, including light, machine power, transformers, switchboard, motor generators, etc. All power entering the plant is controlled through a 66-ft. main switchboard just inside the west wall, beyond which transformer banks and switch houses are located.

All dust and exhaust gases developed in production operations in the plant are removed at their sources through underground networks of ducts. Thirty dust removal units serve many times that number of machines through underfloor ducts connecting each unit with other machines in the same area. The dust is removed and the air is passed through a filter screen and recirculated in the room. Three underground flue gas exhaust systems with fans which draw the gases directly away from the furnaces and other units at 63 different positions to the outside are insulated with corrugated asbestos, and all metal in these systems is covered with a special asbestos cement.

While the entire plant is air conditioned and controlled through hydrostats and thermostats at four strategic positions, special man cooler systems have been provided for the comfort of men working at the furnaces.

To meet the extraordinary requirements of the huge windowless plant where heat-treating furnaces, annealing ovens, and more than 1000 individual motor-driven grinders, cutters and other machines are operated in a single room shared by the factory offices, engineers of the Austin Co. and the Carrier Corp., collaborated in the development of an evaporative cooling system.

Air will be circulated through the building at an adequate rate. It will come into the structure through louvers on the end walls of four lean-to buildings which adjoin the manufacturing plant at points near the corners on either side of the structure. Water used as coolant for the system will be provided by four deep well pumps set outside these buildings, providing an aggregate flow of 1000 gal. per min. at 52 deg. F. The air will be blown through water sprays in each of these structures and will be distributed through the building via 3000 ft. of copper-bearing steel ducts, which range in size from 68 x 90 in. at the fans to 26 x 20 in. at the outlets farthest from the fan units.

All used air will be exhausted through 42 ventilating hoods in the roof above the furnaces and other heat generating equipment, where aprons extending from the ceiling to the bottom chord of roof trusses trap heat at the outset. The air will move into the plant at the wet bulb temperature and it is estimated that the extremely rapid exhaustion of air through the roof above these units will maintain highly satisfactory conditions throughout the plant.

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BOOK REVIEW

"Toward Full Employment"

FOUR prominent American business men, each disclaiming technical training as an economist, have dared to pool their experience, their native common sense and their vision of the future in a joint attack on the most difficult question of present-day economics—unemployment. In an all too brief book of less than 300 pages, H. S. Dennison, president of Dennison Mfg. Co.; R. E. Flanders, president of Jones & Lamson Machine Co.; Lincoln Filene, chairman of the board of William Filene's Sons Co., and M. E. Leeds, president of Leeds & Northrup Co., jointly attempt to diagnose the reasons why the "depression brought demoralizing want in the presence of ample resources for wealth production, and large-scale unemployment while there was work crying to be done on every hand." They acknowledge that the book is the outcome of their belief that "industrialists have a peculiar responsibility for the character of the performance of our economic system."

Starting with the assumption that it is the function of organized society to assure conditions under which each individual, while making his reasonable contribution to the general welfare and fully respecting the rights and personalities of others, shall have freedom and opportunity for his own best development, they proceed by logical reasoning to develop the theme that socially harmful unemployment should not exist in such a society.

How this may be brought about is a problem which is the joint responsibility of industry and government. They examine the requirements for financial stability in business and report on means for controlling the business cycle. They analyze the sources from whence taxes are paid and discuss the advisability of shifting about one billion dollars of present taxes from the stream of consumption to the stream of savings, proposing a Federal-State Tax Commission to study this and other suggestions. They agree, finally, on a proposal for a flexible government budget which will provide means for constant employment; on public projects of lasting value when business is slack, and with business absorbing a larger percentage of employables when business itself is good—all of this program predicated on long range planning of both business activities and public construction.

Within this slim volume there is much food for thought, both for the business man and for the government official. The arguments are buttressed by considerable statistical material in four appendices. The writing is clear, concise and essentially readable. The volume is a valuable contribution to present-day thought on our most vexing problem. Published by Whittlesey House, a division of the McGraw-Hill Book Co., Inc. The price is $2.50.

On The Assembly Line

(CONCLUDED FROM PAGE 60)

according to J. D. Burke, director of truck sales for Dodge. He was talking about a morning driveaway of 250 new Dodge trucks to various points in Illinois, Wisconsin, Indiana and Iowa from the new truck plant at Mound and Eight Mile roads outside Detroit. He declared that the country's business is expanding and replacing its material and merchandise transportation quite rapidly. "In addition to the need for new trucks occasioned by the natural expansion of business, there is the enormous market represented by hundreds of thousands of trucks that were permitted to over-run their normal and safe life of usefulness during recent business recessions. That replacement market accounts for a goodly share of the present upswing in truck buying."

Plymouth has announced a new type of panel delivery truck different from previous commercial cars. The new model combines the best features of a delivery sedan mounted on a passenger car chassis and the usual half-ton commercial panel models. According to the company, it escapes the limitations of both designs. The new model is mounted on the 1939 Roadking chassis, but carries a special panel body with 124 cu. ft. of load space. Formerly, prospective users were forced to choose between delivery sedans of 80-odd cu. ft. capacity and half-ton panels of 130-odd cu. ft. and up. For the sake of a larger loading space, many business men bought the bigger models which were mounted on a heavier chassis than was really required.

General Motors Safety Record

General Motors Corp. has achieved a new all-time industrial safety record for its 86 plants in the United States and Canada. On the basis of records of the National Safety Council and company records, for every 125,000 8-hr. days of operation in 1938 there were only 4.91 lost-time accidents, compared to 5.15 lost-time accidents in 1937 and 5.19 in 1936.

The severity of accidents, representing time off due to mishaps in the plants, was likewise reduced during 1938 to a point where there were only 0.595 days lost to employees for every 1000 hours worked. This compares with 0.652 in 1937 and 0.664 in 1936.

Seven General Motors plants had no lost-time accidents during the entire year. Two of these, the Packard Electric and Sunlight Electrical plants of Warren, Ohio, completed their second year of a perfect safety record without a lost-time accident.

The safety record of 1938 covers more than 213,384,591 man hours of operations. General Motors officials pointed out that the frequency of lost-time accidents has been reduced nearly 78 per cent during the last 10 years.

New Aviation Company Formed

Following closely the anouncement that Joseph W. Frazer, for 15 years an executive of the Chrysler Corp., has taken over duties as president and general manager of the Willys-Overland Motors, Inc., came the incorporation of the American Helicopter Corp., by interests closely affiliated with Willys-Overland.

The new corporation was chartered by George W. Ritter, secretary; Milton McCreary, director, and A. L. Floering, assistant secretary, of Willys-Overland.

Howell French, who was sales promotion manager of Willys-Overland several years ago, is president of the new company, and Mr. Floering is secretary. Development and manufacture of airplanes is the objective of the new company but no anouncement as to details has been made.

Cadman Co. Licensed To Produce Cupaloy

A. W. CADMAN MFG. CO., Pittsburgh, has been licensed by the Westinghouse Electric & Mfg. Co. to produce Cupaloy castings which are said to have the thermal and electrical properties of copper and the strength and hardness of 0.30 carbon steel, and to be capable of retaining these characteristics at operating temperatures up to 750 deg. F. Applications of this alloy include welding electrodes, tips, jaws and clamps, electroplated parts carrying heavy current and numerous motor and switchgear parts.

Hook Attacks, Madden Defends Wagner Act in Radio Debate

WASHINGTON—Charles R. Hook, chairman of the National Association of Manufacturers and president of American Rolling Mill Co., attacked, and J. Warren Madden, chairman of the National Labor Relations Board, defended, the Wagner Act in a debate Sunday night on a nation-wide radio hook-up.

Mr. Hook scored the law itself as "one-sided" and also its administration, which, he said, "might have done much to convert a poor law into a reasonably good and fair law." Mr. Madden, as vigorous in defense as Mr. Hook was in attack, declared that not a single employer was "even so much as arrested in any year" under the act "though there was much violation of it." By contrast, he said, 15 persons were shot to death, scores wounded and thousands arrested during the labor strife of 1937. These points were made by Mr. Madden in support of his contention that the scales of justice and law were weighted heavily against labor.

Amendments Proposed

Mr. Hook proposed amendments which would assure more protection for employers and minorities than is contemplated by pending amendments in Congress. Senate consideration of the amendments, most of them fathered by the AFL, is expected to be taken up within two weeks.

Mr. Hook suggested that the act be amended to recognize the "mutuality of interest of employer and employee" and to assure that employees not be subjected to coercion from any source; to "modify the emphasis" on strikes; to recognize that every man has the right to work unmolested whether or not he is a member of a labor organization and to protect adequately the "paramount public interest."

Declaring that the labor strife of 1937 was "one of the major causes for the precipitous decline of business activity," Mr. Hook said that "the obvious thing to do is to amend the Wagner Act so as to correct its one-sided character, to separate the functions of fact-finding, prosecution and judicial decisions and to do everything the Congress can do to guarantee impartial administration."

Gains Are Claimed

Conceding that strikes were numerous in 1937 "when the act was defied as unconstitutional," Mr. Madden sought to reinforce his argument that significant gains had been made under the act. To this end he said that preliminary estimates of governmental sources "indicate that strikes during 1938 when the act was in regular operation were only one-half as numerous and involved only one-third as many workers" as in the preceding year.

1938 Scrap Exports 3,003,523 Tons; Largest in Any Year Except 1937

WASHINGTON.—United States exports of scrap totaled 3,003,523 gross tons in 1938, according to preliminary figures released by the Metals and Minerals Division, Bureau of Foreign and Domestic Commerce. Included in this total were 2,979,006 tons of iron and steel scrap, 12,554 tons of tin plate scrap, 4709 tons of tin plate circles, strips, cobbles, etc., and 7254 tons of waste-waste tin plate.

Only 1937 exports exceed the total reached in 1938. In that earlier year shipments of these materials amounted to 4,092,590 tons valued at $79,205,113—the 1938 trade being valued at $45,891,993. The smaller total figures of 1938 considered along with the sharply reduced average value of the scrap exported—$14.95 per gross ton against $19.35 in 1937—clearly reflects a world demand which, although still high, has lessened.

Shipments in December—323,691 tons valued at $4,797,676—were well above the November, 1938, trade of 273,440 tons, revised figure, valued at $4,000,084. A year ago, in December, 1937, scrap shipments totaled 319,771 tons and were valued at $5,701,466.

Major 1937 Purchasers Take Less Scrap in 1938

Japan and the United Kingdom, principal buyers of American scrap in 1937, sharply curtailed their purchases in 1938—Japan taking 1,381,901 gross tons against 1,904,768 tons in 1937 and the United Kingdom 390,319 tons against 845,216 tons. Italian purchases, however, rose to a total of 437,025 tons from 381,394 tons in 1937. German takings increased to 230,903 tons from 88,153 tons, while shipments to the Netherlands totaled 206,570 tons against 143,401 tons in the preceding year. Exports to "Poland and Danzig," the only other consuming market to take in excess of 100,000 tons in 1938, aggregated 148,479 tons, a sharp decrease from the 1937 total of 275,337 tons, while Canada bought only 92,217 tons or about one-half her 1937 purchases of 135,566 tons.

Japan and Italy Lead in December Trade

Japan, with purchases aggregating 178,760 tons as compared with 145,076 tons in November, was the principal buyer of scrap in December. Italy and the Netherlands were the month's second and third markets, respectively, taking 72,689 tons and 22,141 tons each of this important industrial raw material. Germany and Poland and Danzig, fourth and fifth markets in point of tonnage, reduced their takings to 13,570 tons and 11,487 tons.

Included in the 323,691-ton December total were 321,261 tons of iron and steel scrap, 1149 tons of tin plate scrap (all of which went to Japan), 730 tons of tin plate circles, etc., and 551 tons of waste-waste tin plate.

Republic Structural Iron Works Co., a division of the Consolidated Iron-Steel Mfg. Co., Cleveland, has been appointed distributer of Steelox industrial buildings in Cleveland and surrounding counties, according to an announcement by the American Rolling Mill Co., Middletown, Ohio.

Metal Trades Body To Hold New England Conference Feb. 10

THE New England Industrial Relations Conference, sponsored by the National Metal Trades Association, will be held Feb. 10 at the Hotel Kimball, Springfield, Mass., where New England employers will hear addresses on "Fundamental Principles of Sound Industrial Relations," by Homer D. Sayre, National Metal Trades Association; "Management Training and Industrial Relations," by C. S. Craigmile, Belden Mfg. Co., Chicago; "Our Training Program," by R. G. Plumley, The Yale & Towne Mfg. Co., Stamford, Conn.; "Recent Developments on Job Rating," by William W. Finlay, Wright Aeronautical Corp., Paterson, N. J., and A. L. Kress, National Metal Trades Association; and "The Practical Aspects of Collective Bargaining under the Wagner Act," by David R. Clarke, Fyffe & Clarke, Chicago.

Senator Edward R. Burke, of Nebraska, will discuss "Behind the Scenes at Washington." Organizations cooperating in the conference are the Employers Associations of Eastern Massachusetts, Western Massachusetts and Hartford County, the Manufacturers Associations of Hartford and New Haven counties and the Worcester County Metal Trade and Employers Association.

Supreme Court Prohibits Allowances for "Spotting" Cars

WASHINGTON—The Supreme Court on Monday upheld an Interstate Commerce Commission order prohibiting payment by the Indiana Harbor Belt Railroad of allowances to the Inland Steel Co. for the latter's spotting cars in its plant. The court also ruled that allowances which the railroad had impounded should be retained by the carrier.

Johns-Manville Opens Massachusetts Plant

LEWIS H. BROWN, president of Johns-Manville Co., has announced establishment of a new plant at North Billerica, Mass., near Lowell, for the manufacture of Marinite and Marine Sheathing, two fireproof panel materials used in ship construction. Coincident with this step, Johns-Manville further announces that Marinite will now be made available for use as an insulating material with temperatures up to 900 deg. F. in ovens, glass lehrs, boilers and other types of heated equipment. The new factory, on which Johns-Manville has signed a long-term lease, is located in the former carshops of the Boston & Maine Railroad.

Sheet & Tube Reports $658,934 Deficit in '38

PRELIMINARY income report of Youngstown Sheet & Tube Co. for the year ended Dec. 31, 1938, indicates a net loss of $658,934 as compared with a profit of $12,190,649 for 1937. Gross income after deductions for Federal taxes, but before depreciation and depletion, was $10,309,046 in 1938 as against $26,322,224 in 1937. Interest on funded debt and other interest charges in 1938 were $3,085,565 in the past year in comparison with $2,694,266 in 1937.

High Wages, Taxes Drive Out Milwaukee Plant

CHICAGO.—High union wage rates, unfavorable location and high tax on personal property has caused the National Enameling & Stamping Co. to decide to move its tinware department from Milwaukee. The community will lose an annual payroll of about $100,000 and jobs for 130 men. The company's stove department will continue to operate in Milwaukee and consists of about 40 per cent of the plant's original operations there. Employees with sufficient seniority will be transferred to the stove department with proportionate layoffs in that department.

December Structural Orders Highest in '38

NEW orders booked by the structural steel industry in December totaled 163,445 tons, largest for any month last year, according to the American Institute of Steel Construction, which reported total bookings for 1938 at 1,256,639 tons, compared with the 1937 total of 1,628,641 tons.

Shipments for December were reported by the institute at 106,457 tons, compared with 99,872 tons in November, and 108,396 tons in December, 1937. The last quarter of 1938 produced a larger volume of business than any corresponding period since 1930, representing a 60 per cent gain over the same months in 1937. Tonnage available for future fabrication was 497,942.

Labor Department's Steel Wage Order Postponed to March 1

WASHINGTON, — Postponement of the Labor Department's order in the steel wage case to March 1, was ordered by Assistant Secretary of Labor Charles V. McLaughlin on Tuesday. It had previously been scheduled to become effective on Tuesday, Jan. 31.

The order directing the 30-day delay made no reference to requests received from 29 small iron and steel producers in the East and from the Bethlehem Steel Corp., which had sought a 60-day delay in the orders effective date to provide additional time for studying costs, necessary adjustments and the economic consequences of the order.

The order said briefly:

"The effective date of my decision in the above-entitled matter (steel wage decision) is hereby postponed until March 1, 1939, in order that industry may make necessary adjustments to comply with the decision."

Telegrams were sent to all companies to be affected by the order, which prescribes four minimum hourly wage rates for the industry, ranging from 45c. to 62½c.

The order apparently closes the door to any appeal for relief although some officials in the Labor Department expect that some companies may ask for exemption under Section 6 of the Public Contracts Act. The law makes no provision for review of a decision by the Secretary of Labor but under a bill sponsored in the House by Representative Francis Walter, Democrat of Easton, Pa., companies could petition a United States Circuit Court for review. The bill was introduced with the steel wage case specifically in mind and some observers believe that the Congressman may press for passage in view of the latest step by the Department.

Rustless Iron & Steel Corp. has moved its Cleveland district sales office into larger quarters at 707 Society for Savings Building, Cleveland.

The Manufacturers & Fabricators Corp., Cleveland, manufacturers of annealing furnaces, will move to nearby Elyria, Ohio, this spring, using three buildings there formerly occupied by Columbia Steel Co.

U. S. Steel's Losses $7,755,914 in 1938

DESPITE a sharp improvement in business in the final quarter, operations of the United States Steel Corp. in 1938 resulted in a deficit for the year of $7,755,914, before preferred dividends. This compares with a profit of $94,944,358 in 1937. After preferred dividend allowances, net deficit in 1938 was $32,975,590. The regular quarterly dividend of $1.75 on preferred stock was declared by the board of directors.

For the fourth quarter the corporation reported a net profit of $4,394,454, before preferred dividends. This compares with a loss of $5,847,791 in the third quarter and a profit of $4,577,983 in the last quarter of 1937.

Finished steel shipments in the fourth quarter, according to announcement by E. R. Stettinius, Jr., chairman of the board, were 2,037,144 tons, or 44.6 per cent of capacity, as against 1,577,870 tons, or 34.6 per cent in the third quarter. For the year 1938 shipments were 6,625,368 tons, or 36.6 per cent of capacity, as compared with 12,748,354 tons or 71.1 per cent in 1937.

The corporation's total payroll in 1938 was $282,209,332, a 36.3 per cent decrease from the previous year's total of $442,927,683. Average number of employees in 1938 was 202,108 against 261,293 in 1937, a decrease of 22.7 per cent. Average hourly earnings rose from 86.4c. in 1937 to 90.2c. in 1938, a gain of 4.4 per cent.

During the first four weeks of January shipments averaged approximately 47 per cent of capacity, according to the announcement, as compared with 32 per cent in the comparable period of 1938.

Machine Flame Hardens Pump Shafts Automatically

CARBURIZED pump shafts and plungers of steel and cast iron are being replaced by flame hardened parts by Goulds Pumps, Inc., which has recently designed and built a machine for this particular purpose. The carburizing took about 6 hr. and very often the work was warped. Time is cut with the flame hardening machine, penetration is greater and warping does not occur. As a result, Goulds can now furnish plungers for triplex pumps that are more serviceable than before and can supply centrifugal pump shafts with the part that comes in contact with the stuffing box packing hardened to 90 seleroscope..

The flame hardening machine will harden work up to 8 in. in diameter by 96 in. long. It is all-steel welded construction and consists, primarily, of a revolving center to rotate work, a torch carriage to hold the flame hardening torches and the quenching jets, and a column to guide the torch carriage. Change gears provide the means of maintaining the proper speed. A separate water supply with a circulating pump maintains constant pressure for the cooling and quenching jets. One motor drives the center and the water pump, while a reversible motor drives the torch carriage raising screw.

Extensive tests show a very uniform close grained hard outer shell is formed for a depth as great as ⅛ in. It is possible to get from 90 to 100 scleroscope on 0.50 carbon steel and from 555 to 600 brinell on cast iron.

o o o

THIS special flame hardening machine was designed by Goulds Pumps for their own use in overcoming certain manufacturing difficulties experienced in hardening cylindrical pieces of relatively small diameter and long length.

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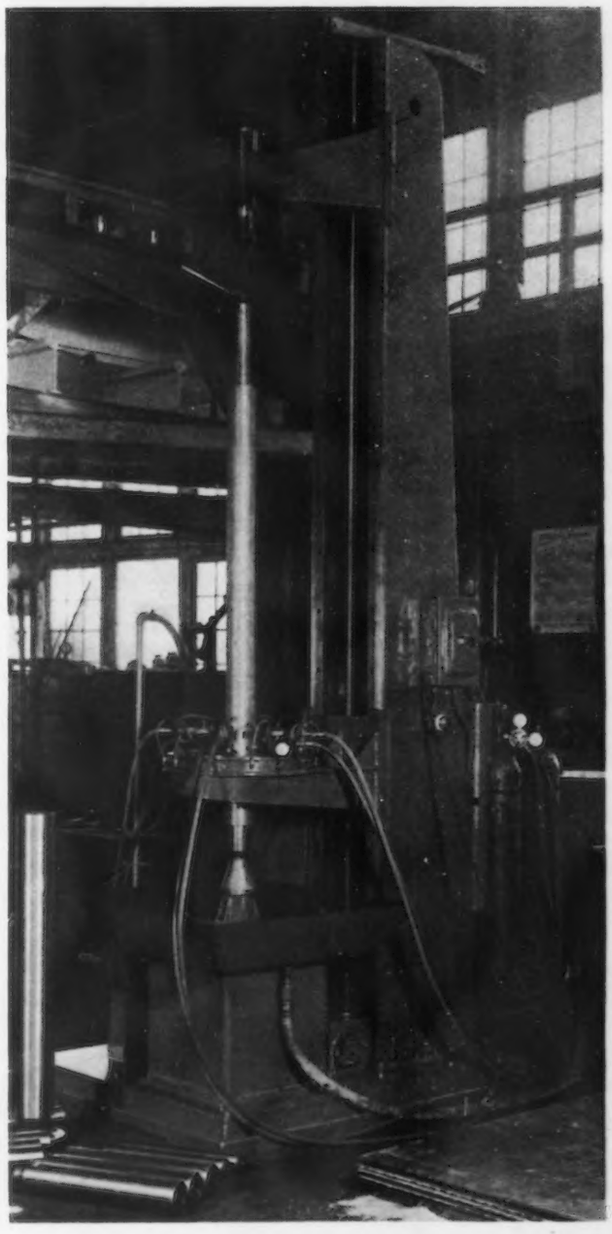


LETTER TO EDITOR

Reciprocity Makes Industry Vulnerable

Editor: The Iron Age:—

UNDER the attack on business by the present administration we manufacturers like to feel that we are martyrs. We know the attack is unjustified, in general. Government, however, has uncovered some abuses which are real enough to justify action in some cases.

One of these abuses which as yet has not been the subject of regulation, but which will and, perhaps, should be, is that of reciprocal buying. This exploded theory is continued only because of its age, not because anyone in industry finds it a satisfactory method of placing business.

Industry, at great expense, sets up a purchasing department, an inspection department and an engineering department, to produce material of proper price and quality. After having done this they put in a reciprocal relations department who override the decisions of the buyer, the inspector and the engineer, and place business merely because of the suppliers' previous purchases from their company. The policy results in frequent strained industrial relations, since no one can buy in a volume to satisfy the reciprocator. Not only that, but the distribution is never fair from the seller's point of view.

Reciprocal buying results in higher prices, since the reciprocator cannot get the best price available. It results in lower quality, since the reciprocator cannot insist on quality. It results in lack of standardization, which enormously increases cost of upkeep.

I can see the joy with which a LaFollette or a Roosevelt will pounce on this industrial foible to show how incompetent is the management of American business. With that proof the New Deal can show it is necessary for government to guide, direct and protect industry. Thus only can it be kept solvent. As a matter of fact, who can show that government is not right in such conclusions? Result: One law, a million new jobs and a billion new taxes.

The worst of it is that in this case the government would have a perfectly clear case to prove its point. No one could take the untenable position that reciprocal buying is anything but asinine and wasteful. However, in the hands of governmental regulation for its elimination, a waste will be turned into regimentation from which industry, perhaps, can never recover.

J. F. Lincoln,
The Lincoln Electric Co.,
Cleveland.

A.I.M.E. Issues Manual of Chart Standards

A MANUAL covering standards of design and construction of time-series charts has been published by the American Society of Mechanical Engineers. The purpose of the manual is to bring together in convenient form standard procedures which have been found successful in constructing graphs. All phases of graph presentation are discussed in detail and line drawings are employed to amplify the text.

Copies of the manual may be obtained at the society's office, 29 West 39th Street, New York, at $1.25 a copy.

Expansivity of Enamels Measured

WASHINGTON — After studying the behavior of a large number of ground-coat enamels during heating and cooling cycles, three Bureau of Standards experts have derived constants for each one which, when substituted in simple first-order equations, permit the computation of the expansivity of each at any stated temperature. The work is regarded by the bureau as a contribution to the technique of enameling metals since differential contraction between the enamel and the iron base is a frequent cause of failure and loss in the manufacture of enameled iron ware.

California Steel Men Will Hold Annual Meeting Feb. 9-11

SAN FRANCISCO — California steel men will gather for the 15th annual Iron and Steel Conference, Feb. 9 to 11 at Del Monte, Cal. Principal speaker will be A. Orman Fulton, Wheelock-Lovejoy & Co., Inc., Cambridge, Mass., president of the American Steel Warehouse Association. He will discuss "The Warehouse, Able Ally of the Steel Mill." The maintenance of sound industrial relations, problems of manufacture and distribution to meet consumer demand in the Far West and Intermountain areas, and recent Federal and state legislative matters are other principal topics to be considered by the delegates.

Harold B. Ressler, Joseph T. Ryerson & Son, Jersey City, N. J., will discuss "Functions of the Steel Distributer" before the merchant steel group.

E. H. McGinnis, United Hardware & Metal Co., Los Angeles, is chairman of the conference. B. J. Osborne, Moore Dry Dock Co., Oakland, is vice-chairman, and the secretary is C. S. Knight of the California State Chamber of Commerce.

American Helicopter Organized at Toledo

TOLEDO. — Following appointment of Joseph W. Frazer as president and general manager of the Willys-Overland Motors, Inc., here, the incorporation of American Helicopter Corp., by interests closely affiliated with Willys-Overland, was announced.

The new corporation was chartered by George W. Ritter, secretary; Milton McCreery, director, and A. L. Floering, assistant secretary, of Willys-Overland. Howell French, who was sales promotion manager of Willys-Overland several years ago, is president of the new company. Development and manufacture of airplanes is the objective of the new company but no announcement as to details has been made.

Spicer Mfg. Works on Job Stabilization

TOLEDO.—Frequent conferences between management representatives and union leaders to seek means of stabilizing employment through the year are provided for in the new contract which has been signed by the Spicer Mfg. Corp. and Local No. 12 of the United Automobile Workers.

The contract runs for a year and maintains current wage levels with a few minor adjustments. The union through its committee, headed by Thomas Burke, financial secretary, had asked for an annual guaranteed wage. The company group, headed by E. C. Mogford, vice-president, worked out the compromise proposal for stabilization.

Under the Ohio merit-rating system for unemployment compensation both workmen and company will benefit by stabilized employment.

FABRICATED STEEL

. . . Lettings slightly higher at 22,450 tons as against 21,800 tons last week . . . New projects lower at 13,500 tons . . . Plate awards call for 10,755 tons.

NORTH ATLANTIC STATES

AWARDS

4000 Tons, Putnam County, N. Y., Delaware Aqueduct, contract 321, to Bethlehem Steel Co., Bethlehem, Pa.; through Frazier-Davis Construction Co., New York.

1325 Tons, Southbury, Conn., hospital and training school buildings, to Bethlehem Steel Co., Bethlehem, Pa.

900 Tons, Palatine Bridge, N. Y., State highway bridge FAGM-8528, to Bethlehem Steel Co., Bethlehem, Pa.

820 Tons, Delhi, N. Y., high school, to Bethlehem Steel Co., Bethlehem, Pa.

600 Tons, Stapleton, N. Y., Marine Hospital addition, to Bethlehem Fabricators, Inc., Bethlehem, Pa.

564 Tons, Jersey City, Isolation Hospital, to Lehigh Structural Steel Co., Allentown, Pa.

470 Tons, Queens, N. Y., Rodman Street bridge, to American Bridge Co., Pittsburgh; Elmhurst Contracting Co., Inc., general contractor.

430 Tons, Mystic, Conn., administration school and dormitory buildings, to Bethlehem Fabricators, Inc., Bethlehem, Pa.

385 Tons, Harrison, N. Y., high school, to Utica Structural Steel Co., Utica, N. Y.; J. A. J. Construction Co., general contractor.

330 Tons, Middletown, Conn., girls' farm school and auditorium, to Bethlehem Steel Co., Bethlehem, Pa.

320 Tons, Queens, N. Y., Bowery Bay sewage treatment plant, to American Bridge Co., Pittsburgh.

270 Tons, Storrs, Conn., Home Economics Building, to Haarman Steel Co., Holyoke, Mass.

250 Tons, Stamford, N. Y., State highway bridge, to American Bridge Co., Pittsburgh; through Mohawk Paving Co., Buffalo.

160 Tons, Elkton, Md., court house, to Dietrich Brothers, Baltimore.

150 Tons, Ithaca, N. Y., office building, to F. L. Heughes & Co., Rochester, N. Y.

135 Tons, Wareham, Mass., dummy bridge, to American Bridge Co., Pittsburgh.

110 Tons, New York School of Music, 228 East 105th Street, to Weatherly Steel Co., Weatherly, Pa.

SOUTH AND SOUTHWEST

1235 Tons, Hallandale, Fla., grandstand for Hollywood Jockey Club, to Virginia Bridge Co., Roanoke, Va.; through J. C. Horning, Inc.

700 Tons, Wyandotte, Okla., Frisco Railroad bridge for Grand River Dam Authority, to American Bridge Co., Pittsburgh.

400 Tons, Stillwater, Okla., college dormitory, to Patterson Steel Co., Tulsa.

315 Tons, Richmond, Ky., Students Union, to Louisville Bridge & Iron Co., Louisville, Ky.; through A. L. Coupe Construction Co.

205 Tons, Hardin County, Tex., bridge, to Mosher Steel Co., Dallas, Tex.; through Russ Mitchell, Inc., Houston, Tex.

155 Tons, Fulton County, Ga., highway bridge, to Virginia Bridge Co., Roanoke; through Macdougald Construction Co.

105 Tons, Tyler County, W. Va., bridge, to Fairmont Mining Machine Co., Fairmont, W. Va.

CENTRAL STATES

2525 Tons, Grand Rapids, Mich., extension to press and metal shop, Fisher Body Co., to American Bridge Co., Pittsburgh.

210 Tons, Albert Lea, Minn., theater, to Joseph T. Ryerson & Son, Inc., Chicago.

156 Tons, Cleveland, Cleveland Pneumatic Tool Co. addition, to Republic Structural Iron Works Co., Cleveland; through Sam W. Emerson Co., Cleveland.

150 Tons, Kankakee, Ill., building for Bear Brand Hosiery Co., to Bethlehem Steel Co., Bethlehem, Pa.

135 Tons, Newberry, Mich., hospital, to Worden-Allen Co., Milwaukee.

130 Tons, Thief River Falls, Minn., high school addition, to American Bridge Co., Pittsburgh.

125 Tons, Zion Township, Ill., high school, to Mississippi Valley Structural Steel Co., St. Louis.

110 Tons, Piketon, Ohio, high school, to C. E. Morris Co., Columbus, Ohio.

WESTERN STATES

2684 Tons, Seattle, units 5 and 9, Lake Washington Bridge, to Pacific Car & Foundry Co., Seattle; through Puget Construction Co., Seattle, contractor.

922 Tons, Yellowstone National Park, Wyo., bridge for Bureau of Public Roads, Denver, to J. B. Klein Iron & Foundry Co., Oklahoma City; through Guy H. James, Tulsa, Okla., contractor.

350 Tons, Los Angeles, ribs for Treasury Department, to Commercial Shearing & Stamping Co., Los Angeles.

300 Tons, Twin Falls, Idaho, Rock Creek bridge, to Bethlehem Steel Co., Bethlehem, Pa.

187 Tons, Grand Coulee, Wash., power plant, pier noses (Specification 1163-D), to Enterprise Foundry Co., San Francisco.

100 Tons, Burbank, Cal., press building addition at Lockheed aircraft plant, to Pacific Iron & Steel Co., Los Angeles.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

7500 Tons, Wawarsing, N. Y., Delaware aqueduct, contract 313, Samuel Rosoff, New York, low on general contract (previously reported).

500 Tons, Buffalo, public school; bids close Feb. 28.

400 Tons, Binghamton, N. Y., office building.

300 Tons, Kent, Conn., school building.

300 Tons, Worcester, Mass., bottling plant for Coca-Cola Bottling Co.

250 Tons, Harrisburg, Pa., store building; bids being received.

250 Tons, Springfield, Mass., F. W. Woolworth Co. store.

230 Tons, Clayton, N. Y., school building.

225 Tons, New York, alterations to building for Real Estate Industrials, Inc.

215 Tons, Kearny, N. J., boiler foundations for Public Service Electric & Gas Co.

200 Tons, Corfu, N. Y., high school; bids Feb. 10.

200 Tons, Fillmore, N. Y., school; bids close Feb. 16.

125 Tons, Jessups, Md., women's State prison buildings.

100 Tons, Van Etten, N. Y., school.

Unstated Tonnage, Phelps, N. Y., school, cost $160,000; bids due Feb. 16.

Unstated Tonnage, Buffalo, Hamburg Street pumping station, Buffalo Sewer Authority. Cost $90,000; bids close Feb. 9.

SOUTHWESTERN

373 Tons, Winslow, Ariz., bridge; bids Feb. 7 (date advanced).

CENTRAL STATES

8500 Tons, Rock Island, Ill., Mississippi River bridge; bids Feb. 17.

500 Tons, Chicago, R. R. Donnelley & Sons Co. extension; bids Feb. 2.

350 Tons, Steubenville, Ohio, high school.

125 Tons, Cincinnati, mill building for Phillips Pump & Tank Co.

WESTERN STATES

260 Tons, Chapman, Mont., overpass.

184 Tons, Spangle, Wash., undercrossing.

Unstated Tonnage, Flathead project, Montana, building frame; bids to United States Indian Irrigation Service, Los Angeles, Feb. 6.

Unstated Tonnage, Mare Island, Cal., and Puget Sound, Wash., two 50-ton cranes for navy yards; R. W. Kaltenbach Corp., Cleveland, low on items 1 and 5; Star Iron & Steel Co., Tacoma, Wash., low on items 6 and 6y.

FABRICATED PLATES

AWARDS

4000 Tons, Boston, aqueduct pressure pipe, metropolitan district water supply project, to Bethlehem Steel Co., Bethlehem, Pa.; through Lock Joint Pipe Co., Ampere, N. J.

4000 Tons, Corbett, Wyo., Buck Creek Springs and Shoshone siphons (Specification 814), to Consolidated Steel Corp., Los Angeles.

1100 Tons, Puget Sound Navy Yard, Wash., caisson gate for dry dock No. 4, Navy, to Puget Sound Machinery Depot, Puget Sound, Wash.

910 Tons, Detroit, 72-in. steel pipe, to Alco Products Co., Dunkirk, N. Y.

625 Tons, Chicago, covers for 15 barges, Central Barge Co., to Marietta Mfg. Co., Point Pleasant, W. Va.

120 Tons, Port Arthur, Tex., weldel tank, Gulf Oil Corp., to Petroleum Iron Works Co. of Texas, Houston, Tex.

PENDING PROJECTS

Unstated Tonnage, Seattle, oil carrier for Petroleum Navigation Co.; Commercial Iron Works, Portland, Ore., low bidder at $155,000.

SHEET PILING

AWARDS

850 Tons, Tongue Point, Ore., lighthouse, to Bethlehem Steel Co., Portland, Ore.

PENDING PROJECTS

600 Tons, Cleveland, Carter Road, West Third Street bridge; contract to Lombardo Brothers Construction Co., Cleveland (previously reported).

500 Tons, Cleveland, cut No. 5-A, Collision Bend, Cuyahoga River; contract to L. A. Wells Construction Co., Cleveland (previously reported).

Current Metal Working Activity

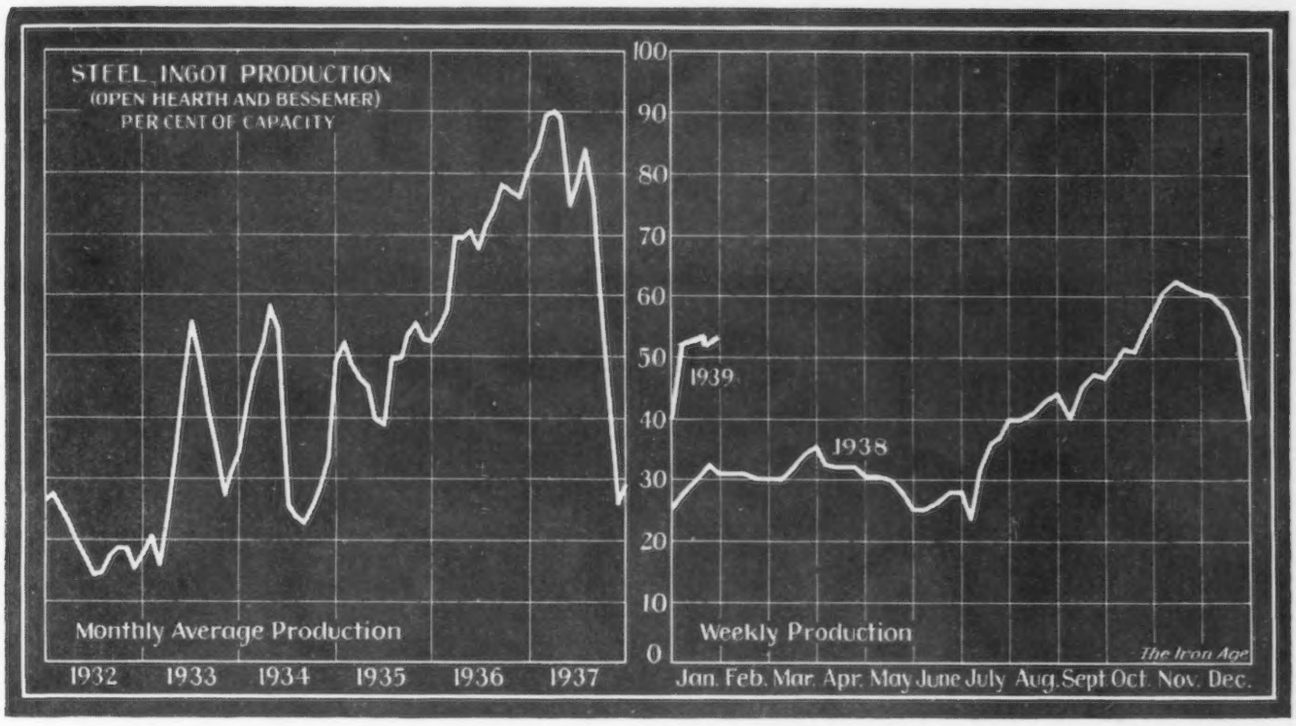
Latest Data Assembled by THE IRON AGE from Recognized Sources

	December 1938	November 1938	December 1937	Twelve Months 1938	Twelve Months 1937
Steel Ingots: (gross tons)					
Monthly output[a]	3,143,169	3,572,220	1,473,021	27,839,261	49,502,907
Average weekly output[a]	711,124	832,685	333,263	533,933	949,423
Per cent of capacity[a]	53.00	62.05	25.37	39.79	52.14
Pig Iron: (gross tons)					
Monthly output[b]	2,201,627	2,269,983	1,490,324	18,773,135	36,611,317
Raw Materials:					
Coke output[c] (net tons)	3,441,545	3,347,723	2,996,525	32,661,392	52,375,500
Lake Ore consumed[d] (gross tons)	3,040,700	3,150,073	1,916,588	25,703,050	53,996,076
Castings: (net tons)					
Malleable, orders[e]	35,633	36,643	19,753	289,384	549,972
Steel, orders[e]	.....	30,428	27,024	.....	877,459
Finished Steel: (net tons)					
Trackwork shipments[a]	2,620	2,276	3,804	34,710	92,121
Fabricated shape orders[f]	163,445	153,084	99,070	1,256,639	1,628,641
Fabricated plate orders[e]	28,218	20,213	27,463	285,061	428,884
U. S. Steel Corp. shipments[g]	694,204	679,653	489,070	6,625,368	12,748,354
Fabricated Products:					
Automobile production[h]	411,319*	390,350	346,886	2,660,000*	5,016,437
Steel furniture shipments[e]	.....	$1,707‡	$2,125‡	.....	$26,973‡
Steel boiler orders[e] (sq. ft.)	.....	635,108	546,615	.....	9,923,457
Locomotives ordered[i]	28	3	77	228	368
Freight cars ordered[i]	2,674	132	3,287	16,539	52,788
Machine tool index[j]	146.5	112.2	142.7	125.6†	140.8†
Foundry equipment index[k]	141.8	89.7	111.2	106.5†	142.4†
Non-Ferrous Metals: (net tons)					
Lead shipments[l]	.....	42,030	34,020	.....	575,933
Lead stocks[l]	.....	115,236	129,131	.....	.....
Zinc shipments[m]	38,999	43,693	28,675	395,199	569,241
Zinc stocks[m]	126,604	120,778	65,333	.....	.....
Tin deliveries[n] (gross tons)	3,400	3,535	5,020	50,660	83,665
Refined copper deliveries[o]	47,680	64,557	22,788	607,081	865,893
Refined copper stocks[o]	289,755	269,488	259,351	.....	.....
Exports: (gross tons)					
Total iron and steel[p]	.....	646,157	626,418	.....	7,567,884
All rolled and finished steel[p]	.....	120,610	450,555	.....	4,772,240
Scrap[p]	.....	448,020	319,016	.....	4,039,143
Imports: (gross tons)					
Total iron and steel[p]	.....	27,627	25,792	.....	533,160
Pig iron[p]	.....	1,493	9,128	.....	111,697
All rolled steel[p]	.....	12,554	14,475	.....	284,571
British Production: (gross tons)					
Pig iron[q]	445,800	461,500	783,800	6,762,700	8,495,200
Steel Ingots[q]	655,700	860,000	1,103,800	10,393,800	12,964,000

† Three months' average. ‡ 000 omitted. * Preliminary.

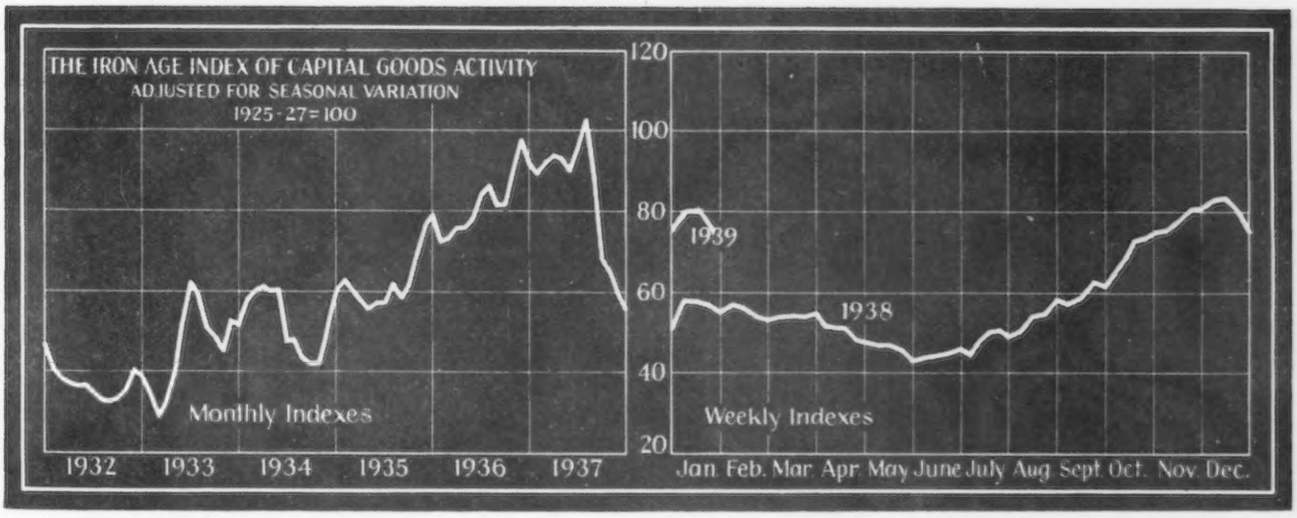
Source of data: [a] American Iron and Steel Institute; [b] THE IRON AGE; [c] Bureau of Mines; [d] Lake Superior Iron Ore Association; [e] Bureau of the Census; [f] American Institute of Steel Construction; [g] United States Steel Corp.; [h] Preliminary figures from Ward's Automotive Reports—Final figures from Bureau of the Census, U. S. and Canada; [i] *Railway Age;* [j] National Machine Tool Builders Association; [k] Foundry Equipment Manufacturers Association; [l] American Bureau of Metal Statistics; [m] American Zinc Institute; [n] New York Commodity Exchange; [o] Copper Institute; [p] Department of Commerce; [q] British Iron and Steel Federation.

Ingot Production Rises 1½ Points to 53.5 Per Cent



District Ingot Production, Per Cent of Capacity	Pitts-burgh	Chicago	Valleys	Phila-delphia	Cleve-land	Wheel-ing	Buffalo	Detroit	Southern	S. Ohio River	Western	St. Louis	East-ern	Aggre-gate
CURRENT WEEK..	47.0	48.5	47.0	35.0	61.0	79.0	46.5	87.5	68.0	53.0	60.0	60.0	60.0	**53.5**
PREVIOUS WEEK..	46.0	46.0	47.0	35.0	57.0	79.0	45.0	87.5	65.0	60.0	45.0	45.0	60.0	**52.0**

Capital Goods Output Levels Off; Index Declines to 81.5



A GENERAL leveling off of activity throughout the heavy industries in place of the usual seasonal improvement usually experienced at this time, caused THE IRON AGE index of capital goods activity to decline 1.9 points to 81.5 for the week ended Jan. 28. The physical output of the various industries represented in the index showed only minor variations from the previous week's levels, but after adjustment for seasonal trends, losses varying from 5.4 points in the steel series to 0.1 point in the construction factor were recorded. The lumber series improved slightly in the week, but continues to lag behind the other factors in the extent of improvement since the first of the year.

	Week Ended Jan. 28	Week Ended Jan. 21	Comparable Week 1938	Comparable Week 1929
Steel ingot production[1]	80.5	85.9	44.1	118.7
Automobile production[2]	95.4	98.0*	70.1	154.0
Construction contracts[3]	104.7	104.8	66.4	122.7
Forest products carloadings[4]	57.5	56.9	54.2	134.7
Production and shipments, Pittsburgh District[5]	69.5	71.4	52.4	118.6
Combined index	**81.5**	**83.4***	**57.4**	**129.7**

* Revised.

Sources: 1. THE IRON AGE; 2. Ward's Automotive Reports; 3. *Engineering News-Record;* 4. Association of American Railroads; 5. University of Pittsburgh.

. . . SUMMARY OF THE WEEK . . .

. . . Ingot rate higher as orders improve slightly.

° ° °

. . . Automobile buying expected some time in February.

° ° °

. . . More railroad orders placed; steel scrap composite lower.

A GRADUAL improvement in steel buying during January has turned ingot production upward after last week's minor recession. This week's rate is estimated at 53½ per cent, a gain of a point and a half. With an easing of the political tension in Europe, the steel trade is confident of further improvement during February and March.

Railroad buying is still counted on as one of the most cheering prospects, though automotive purchases of steel by late February are also looked forward to as one of the developments that will assist in pushing steel production upward. Tin plate buyers are cautious because of the large carryover of canned goods, but they cannot delay much longer in whatever preparations are to be made for the 1939 canning season. Tin plate production is about 45 per cent of capacity, with a rising trend indicated for some time in the near future.

Outstanding railroad orders of the week were 40,507 tons of rails placed by the Southern Pacific and 30,000 tons by the Milwaukee Road, 300 flat cars for the Union Pacific, 25 tank cars for the Great Northern, 20 cars for the Mexican government railways and two streamline trains for the Chicago & North Western. Contemplated purchases for which inquiries may appear soon are 700 box cars for the Denver & Rio Grande Western and streamline trains for the Chicago, Rock Island & Pacific. The Wabash has been authorized to buy 10,000 tons of rails. Orders for steel from car builders and railroad repair shops are growing to be a more important factor each week in the steel mill rollings.

In steel buying the automobile industry continues to pursue a cautious policy in the midst of the winter lull in motor car sales, but car assemblies are maintaining a good pace. Last week's assemblies of 89,200 units compared with 59,365 in the corresponding week last year and with 76,620 in the corresponding week of 1937, which was a 5,000,000-car year. Sales have been running well ahead of those of January, 1938. Last week's slight loss in assemblies as compared with the previous week was due entirely to the temporary shutdown of one plant, other manufacturers holding to their established schedules.

Although fabricated structural steel awards reached their largest 1938 total in December, 163,445 tons, as reported by the American Institute of Steel Construction, the January total will be considerably lower. The past week's awards were about 22,500 tons and new projects in the market amounted only to 13,500 tons. However, there were reinforcing lettings of 21,500 tons, including 14,000 tons, mostly rods, for the Boston aqueduct, and plate awards of 10,750 tons included 4000 tons for the same job, which also takes 8000 tons of sheets, the entire project requiring about 28,000 tons of steel. Siphons at Corbett, Wyo., also took 4000 tons of plates.

Ten ships awarded to eastern shipbuilders by the Maritime Commission will take 43,700 tons of steel.

Bids have been invited by the Navy department by March 22 for the construction of an airplane carrier, which will take 5000 tons of steel.

IT appears likely that some of the smaller mills, particularly in the East, will refrain from bidding on Government work which comes under the Walsh-Healey Act, or, if they do bid and obtain contracts, the work will be segregated in their plants to comply with the 62½c. per hour wage minimum, which the Public Contracts Board will put into effect March 1. There is no indication that such mills will raise the minimum pay on non-government work to 62½c.

SCRAP exports in 1938 totaled 3,003,523 gross tons, the largest on record excepting those of 1937, which were 4,092,590 tons.

The domestic scrap market has not responded this week to the slightly higher steel production rate. The average price is down 12½c. a ton at Pittsburgh and 25c. a ton at Chicago, bringing about a reduction in THE IRON AGE composite price of 12½c. to $14.875, which is the lowest since early November. A leading producer at Pittsburgh bought about 23,000 tons at $15.25, though other interests in that territory are still paying as high as $16. The recent sale at Pittsburgh, together with smaller transactions in the past few weeks, has created an apparent shortage of the No. 1 grade in that area. At Chicago the range on No. 1 steel has become $13.50 to $14 instead of a flat $14, making a 25c. decline in the average.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	Jan. 31, 1939	Jan. 24, 1939	Jan. 3, 1939	Feb. 1, *1938
Rails, heavy, at mill	$40.00	$40.00	$40.00	$42.50
Light rails: Pittsburgh, Chicago, Birmingham	40.00	40.00	40.00	43.00
Rerolling billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point.	34.00	34.00	34.00	37.00
Sheet bars: Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point	34.00	34.00	34.00	37.00
Slabs: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	37.00
Forging billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham	40.00	40.00	40.00	43.00
Wire rods: Nos. 4 and 5, Pittsburgh, Chicago, Cleveland	43.00	43.00	43.00	47.00
Skelp, grvd. steel: Pittsburgh, Chicago, Youngstown, Coatesville, Sparrows Point, cents per lb.	1.90	1.90	1.90	2.10

Finished Steel

Cents Per Lb.:				
Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham	2.25	2.25	2.25	2.45
Plates: Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont	2.10	2.10	2.10	2.25
Structural shapes: Pittsburgh, Chicago, Gary, Buffalo, Bethlehem, Birmingham	2.10	2.10	2.10	2.25
Cold finished bars: Pittsburgh, Buffalo, Cleveland, Chicago, Gary	2.70	2.70	2.70	2.90
Alloy bars: Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton	2.80	2.80	2.80	3.00
Hot rolled strip: Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown, Birmingham	2.15	2.15	2.15	2.40
Cold rolled strip: Pittsburgh, Cleveland, Youngstown	2.95	2.95	2.95	3.20
Sheets, galv., No. 24: Pittsburgh, Gary, Sparrows Point, Buffalo, Middletown, Youngstown, Birmingham	3.50	3.50	3.50	3.80
Hot rolled sheets: Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown	2.15	2.15	2.15	...
Cold rolled sheets: Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown	3.20	3.20	3.20	...

Cents Per Lb.:	Jan. 31, 1939	Jan. 24, 1939	Jan. 3, 1939	Feb. 1, *1938
Wire nails: Pittsburgh, Chicago, Cleveland, Birmingham	2.45	2.45	2.45	2.75
Plain wire: Pittsburgh, Chicago, Cleveland, Birmingham	2.60	2.60	2.60	2.90
Barbed wire, galv.: Pittsburgh, Chicago, Cleveland, Birmingham	3.20	3.20	3.20	3.40
Tin plate, 100 lb. base box: Pittsburgh and Gary	$5.00	$5.00	$5.00	†$5.35

*Pittsburgh prices only.
†Subject to post-season adjustment.

Pig Iron

Per Gross Ton:				
No. 2 fdy., Philadelphia	$22.84	$22.84	$22.84	$25.84
No. 2 Valley furnace	21.00	21.00	21.00	24.00
No. 2, Southern Cin'ti	21.06	21.06	21.06	23.39
No. 2, Birmingham	17.38	17.38	17.38	20.38
No. 2, foundry, Chicago†	21.00	21.00	21.00	24.00
Basic, del'd eastern Pa.	22.34	22.34	22.34	25.34
Basic, Valley furnace	20.50	20.50	20.50	23.50
Malleable, Chicago†	21.00	21.00	21.00	24.00
Malleable, Valley	21.00	21.00	21.00	24.00
L. S. charcoal, Chicago	28.34	28.34	28.34	20.24
Ferromanganese, seab'd carlots	80.00	80.00	92.50	102.50

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh.	*$15.625*	$15.75	$15.75	$14.25
Heavy melting steel, Phila.	15.25	15.25	15.25	14.75
Heavy melting steel, Ch'go.	*13.75*	14.00	13.75	13.00
Carwheels, Chicago	12.50	12.50	12.50	15.50
Carwheels, Philadelphia	16.75	16.75	16.75	15.75
No. 1 cast, Pittsburgh	15.50	15.50	15.50	16.25
No. 1 cast, Philadelphia	16.75	16.75	16.75	16.25
No. 1 cast, Ch'go (net ton)	12.75	12.75	12.50	12.50

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$3.75	$3.75	$3.75	$4.00
Foundry coke, prompt	4.75	4.75	4.75	5.00

Non-Ferrous Metals

Cents per Lb. to Large Buyers:				
Copper, electrolytic, Conn.	11.25	11.25	11.25	10.00
Copper, lake, New York	11.375	11.375	11.375	10.125
Tin (Straits), New York	**46.45**	46.25	46.50	40.875
Zinc, East St. Louis	4.50	4.50	4.50	5.00
Zinc, New York	4.89	4.89	4.89	5.35
Lead, St. Louis	**4.70**	4.60	4.70	4.75
Lead, New York	**4.85**	4.75	4.85	4.90
Antimony (Asiatic), N. Y.	14.00	14.00	14.00	15.625

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
January 31, 1939	2.286 a Lb.	$20.61 a Gross Ton	$14.875 a Gross Ton
One week ago	2.286	20.61	15.00
One month ago	2.286	20.61	14.92
One year ago	2.512c.	23.25	14.00
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.	Based on No. 1 heavy melting at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1938	2.512c., May 17	2.211c., Oct. 18	$23.25, June 21	$19.61, July 6	$15.00, Nov. 22	$11.00, June 7
1937	2.512c., Mar. 9	2.249c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 16
1936	2.249c., Dec. 28	2.016c., Mar. 10	19.73, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.062c., Oct. 1	2.056c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 23
1934	2.118c., Apr. 24	1.945c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.953c., Oct. 3	1.792c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.915c., Sept. 6	1.870c., Mar. 15	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.981c., Jan. 13	1.883c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.192c., Jan. 7	1.962c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.223c., Apr. 2	2.192c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.192c., Dec. 11	2.142c., July 10	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 17	13.08, Nov. 22

. . THIS WEEK'S MARKET NEWS . .

STEEL OPERATIONS

. . . Rate for industry 53½%
. . . Many districts gain

SEVERAL of the major steel producing districts have made gains this week in ingot production, exceptions being the YOUNGSTOWN area and EASTERN PENNSYLVANIA. The rate for the industry is estimated at 53½ per cent, a gain of one and a half points over last week.

Output at PITTSBURGH is up one point to 47 per cent; CHICAGO has gained two and a half points to 48½ per cent; the CLEVELAND-LORAIN rate is up four points to 61 per cent; BUFFALO is up one and a half points to 46½ per cent, and BIRMINGHAM has gained three points to 68 per cent.

The only loss is in SOUTHERN OHIO, where the rate has dropped seven points to 53 per cent. Other districts not mentioned are virtually unchanged.

NEW BUSINESS

. . . January orders moderately better than those of December

JANUARY orders at PITTSBURGH show approximately a 20 per cent gain over December business. Meanwhile, total bookings during the past week were about on a par with those of the week before. An automotive interest late last week made some fair-sized fill-in purchases reported to be at the full published prices. Further rail tonnage is expected in the near future. Actual rail orders placed so far for rolling early this year approximate 400,000 tons against about 500,000 tons produced during the whole of 1938.

At CLEVELAND and YOUNGSTOWN orders during January were ahead of those of December by a small margin. Consumer inventory replacements during January accounted for the increase. Miscellaneous volume has held up better than expected, while requirements of some of the largest steel buyers were below expectations. Shipments of finished steel fell off from December.

For activity during the remainder of the first quarter, considerable depends upon the automotive industry, expected to re-enter the market before long.

January shipments from CHICAGO mills were about equal to or slightly above those of December, with bookings being in excess in one case as much as 60 per cent. The lull noticeable over the past two weeks is still apparent, but the statement that price weaknesses are responsible is given no credence in this area. More acceptable as a reason is the fact that other than rails, no railroad buying of any importance has lately been seen, and that automobile production, geared closely to winter sales, is demanding little steel currently. Hand-to-mouth buying continues general in the vicinity of CHICAGO. Stocks are very low in many plants and a sustained period of good business would result in rush orders.

The largest construction project in CHICAGO is the subway, the steel for the second section of which, totaling some 6000 tons, may be bought within 10 days. Bids are being taken Feb. 2 on third section steel requirements, amounting to about 5500 tons of reinforcing bars and liner plates. The city of Rock Island, Ill., is taking bids on 8500 tons of shapes for a Mississippi River bridge.

Bookings are moderately improved in SOUTHERN OHIO. Total steel orders were a trifle better the past week than the early December average.

At ST. LOUIS some inquiry has appeared for sheets and plates from the railroad equipment builders. Stove plants are specifying more heavily on sheets. Warehouse and jobbing interests continue to purchase in fair volume. Bar demand is apparently broadening, though recent orders have been mainly of small individual size. The entire category of building materials remains quiet, being affected by seasonal influences.

In the NEW YORK market some steel companies report moderately better business in January than was received in December, each week this year having brought some gain. A gain in operations at BUFFALO is credited mainly to some automobile orders.

New projects have slowed up materially on the PACIFIC COAST.

PRICES

. . . Mill prices holding firm on current transactions

THERE have been no new developments in the steel price situation. Mill prices are holding firmer than in many months, though some weakness persists in secondary markets. Moderate-size tonnages placed at Detroit in the past week brought full published prices, it is reliably stated.

A CHICAGO mill reports that its orders have gained since reports of price weakness were published on Monday of last week, thereby refuting the claim that many buyers are holding back because of price talk.

PIG IRON

. . . January shipments in North-Central area gain sharply

PIG iron shipments from furnaces in the North-Central area gained sharply in January over those of December. Some CHICAGO sales offices report the largest shipments in 13 months, the January totals exceeding those of December, the best month of 1938, by 15 to 20 per cent. January deliveries by CLEVELAND producers also ran well ahead of those of December, but are now beginning to taper.

In the districts served by CHICAGO, CLEVELAND and other nearby furnaces automotive, farm implement and machine tool foundries were the principal recipients of the larger shipments in January.

There has also been a moderate improvement in shipments of iron to consumers in the CINCINNATI and ST. LOUIS territories. In the ST. LOUIS area the melt has been gaining during January as a result of larger operations by stove makers, specialty manufacturers and jobbing foundries.

Prices seem to be firm in all localities. On the Atlantic Seaboard some foreign iron is coming in, but not enough to disturb the price situation. In all districts, however, the volume of new business is exceedingly small.

PLATES

. . . General run of orders light despite some large projects

THE general run of plate orders is light despite the fact that some large projects requiring plates have recently come into the market.

The 10 ship awards last week by the Maritime Commission to Eastern shipyards will take about 43,700 tons of steel, mostly plates, but deliveries of this tonnage will be spread over so long a period that no immediate effect on the situation will be felt.

Extreme dullness is being experienced by the Eastern plate mills. Some are refraining from putting in bids on Government inquiries that come under the Walsh-Healey Act. There appears to be no willingness on the part of such mills to advance their minimum wage rate to 62½c per hr., as required by the Public Contracts Board of the Department of Labor, and if they do take any Government jobs they will be segregated in their plants.

Pipe for the Buck Creek Springs and Shoshone siphons at Corbett, Wyo., will be fabricated by the Consolidated Steel Corp., Los Angeles, which will use about 4000 tons of plates for the jobs.

Railroad, shipbuilding and Government projects make up the bulk of present plate awards and inquiries.

STRUCTURAL STEEL

. . . Delaware job to Bethlehem, Fisher order to American Bridge

AWARDS this week were led in the NEW YORK area by 4000 tons for the Delaware aqueduct, going to Bethlehem Steel Co., which also took 1325 tons for a hospital and training school at Southbury, Conn., and 900 tons for a state highway bridge at Palatine Bridge, N. Y.

A total of 2525 tons of steel to be used in an extension to Fisher Body Co.'s press and metal shop, at Grand Rapids, Mich., went to American Bridge Co., along with 700 tons of material for a railroad bridge at Wyandotte, Okla.

Meanwhile structural steel orders booked during December totaled 163,445 tons, largest for any month of last year, according to the American Institute of Steel Construction which estimated the total tonnage for 1938 at 1,256,639 tons compared with 1,628,641 tons in 1937.

Contracts placed in the past week included 1235 tons for a Hallendale, Fla., grandstand going to Virginia Bridge & Iron Co., Roanoke, Va., and 2684 tons of shapes for units 5 and 9 of the Lake Washington bridge, awarded to Pacific Car & Foundry Co. by Puget Construction Co., the contractor.

The WEST COAST area reports few new projects. A Mississippi River bridge at Rock Island to require 8500 tons will be bid Feb. 17. PITTSBURGH finds structural specifications leveling off slightly with inquiries comparable to those of a week ago. ST. LOUIS reports fabricators slightly less active with the spring outlook good for a large volume of public works. A new public school in the city of BUFFALO will require 500 tons of structural steel, with bids closing Feb. 28.

SEMI-FINISHED STEEL

. . . Non-integrated mills are buying cautiously

SEMI-FINISHED steel demand continues to hold up at PITTSBURGH, supported entirely by hand-to-mouth buying. Tonnages booked in the past few weeks have shown little or no change from weekly averages earlier in the month. Non-integrated steel manufacturers, like other industrialists, continue the policy of cautious buying pending clarification of the spring business outlook.

Semi-finished sales at CLEVELAND for the month of January were ahead of December by a very small margin.

Market Sidelights

An increase in ore mining operations of the Tennessee Coal, Iron & Railroad Co., effective Feb. 1, was announced by C. E. Abbott, vice-president in charge of raw materials. Night shift operation will be added next Tuesday night at Ore Mine No. 8 Wenonah. The increase will place in double-shift operation all except one of the Tennessee company's ore mines, Wenonah No. 10, which operates on single-shift.

* * *

Employment in Toledo industrial plants continues about 25 per cent above a year ago. Fifty-one selected plants show 16,491 at work.

* * *

A survey conducted recently through the united efforts of several Toledo, Ohio, organizations indicates 15,000 new automobiles are expected to be purchased there during 1939, against only 5802 new cars sold during 1938.

Ford Motor Co. is expected to place orders for a substantial steel tonnage about Feb. 10. No estimate is available, but it is expected that the buy will be based on anticipated higher production in late February and March.

* * *

A contract approximating $290,000 has been booked by Allis Chalmers Mfg. Co., Milwaukee, for electrical equipment for Youngstown Sheet & Tube Co.'s expansion at Indiana Harbor, Ind. Two large motor generator sets to be used in changing from a. c. to d. c. for hot strip mill motors and three indoor transformers were included in the order.

* * *

Approximately 5000 tons of steel will be required in the construction of one aircraft carrier, bids on which have been invited by the Navy Department for submission on or before March 22.

SHEETS AND STRIP

. . . New business is not assuming impressive proportions

AS many consumers and jobbers are now fairly well stocked in these commodities as a result of heavy shipments during the past few months, the volume of new business is not reaching impressive proportions. The tendency of automobile manufacturers to buy on a hand-to-mouth basis during the winter lull in car sales is also a factor in limiting the new orders.

At PITTSBURGH the total volume of sheet ordering receded slightly in the past week, part of the decrease being due to a contraction in miscellaneous demand, which was partly offset by fill-in orders from the automobile industry. Motor car and truck manufacturers are expected to make larger purchases some time in February, opinion at PITTSBURGH being that these will come in the latter half of the month.

At CLEVELAND the orders received in January were in smaller total volume than those of December, while shipments showed an ever greater decline. Much the same situation is reported from CHICAGO, where releases and orders from DETROIT have not been important lately.

One of the more encouraging reports is from SOUTHERN OHIO, where sheet demand has improved sufficiently to push production up to about

55 per cent. Export orders were a factor in this gain.

At ST. LOUIS the requirements of stove and refrigerator manufacturers are uppermost in current shipments and orders. The movement of galvanized roofing to the South and Southwest is measurably larger than a year ago.

United States Treasury Department, SAN FRANCISCO, asks bids Feb. 14 for furnishing 392 steel shelters for various California migratory labor camps.

Prices are firm in all districts. There is no evidence to substantiate recent reports in daily newspapers of price weakness in sheets and strip. A case in point is the sale of 1000 tons at full published quotations.

About 8000 tons of sheets for the aqueduct to be built by the Lock Joint Pipe Co., Ampere, N. J., for the Metropolitan Water Commission of Boston was divided between two mills.

WIRE PRODUCTS

. . . January improvement did not materialize as expected

THE slight gain in the sale of merchant wire products apparent at PITTSBURGH a week ago, continues to hold its own and January bookings were moderately ahead of the total tonnages placed in December. Requirements for manufacturers' wire have receded slightly due mostly to a smaller number of releases from the automobile industry. Mill prices on wire products remain comparatively firm.

The strong demand expected by CLEVELAND producers during the first quarter has not materialized yet, but January orders were slightly ahead of December's. Specifications from jobbers have improved. Manufacturers' wire continues in fair demand while rods are moderately active.

Orders received by CHICAGO sellers during January were good, but releases have been coming in at a slower rate. Manufacturing wire has shown signs of easing, especially in plants associated with the automobile industry, where production is proceeding cautiously and in accordance with actual orders. Rural uses for merchant products are few under current weather conditions and no need exists for the farmer to buy his requirements at present.

RAILROAD BUYING

. . . Southern Pacific orders 40,507 tons of rails . . . Some cars bought

THE largest rail order of the week was 40,507 tons placed by the Southern Pacific, divided as follows: Columbia Steel Co., 19,273 tons; Bethlehem Steel Co., 12,264 tons; Colorado Fuel & Iron Corp., 8970 tons. Bethlehem Steel Co. received a 600-ton order from the Boston & Maine.

The Milwaukee Road has placed 22,000 tons of rails with Carnegie-Illinois and 8000 tons with Inland, a total of 30,000 tons. The Burlington's 1939 rail program calls for the purchase of 10,000 tons of rails and 2500 tons of fastenings, for which orders may not be placed before spring, as the road is carrying over 17,500 tons of rails from last year.

New equipment orders included 300 flat cars for the Union Pacific, 25 tank cars for the Great Northern and 10 flat cars and 10 gondolas for the Mexican Government Railways.

Contemplated purchases on which formal inquiries have not yet been released are 700 box cars for the Denver & Rio Grande Western and streamline trains for the Chicago, Rock Island and Pacific.

Two new light-weight streamline trains have been ordered by the Chicago & North Western. The Electro-Motive Corp. will supply the diesel-electric locomotives, while the 20 passenger cars will be built by Pullman Standard Car Mfg. Co.

About 10,000 tons of light rails have been sold to a Brazilian railroad.

The Federal Court at ST. LOUIS has authorized the Wabash Railway to expend $2,128,670 in 1939, including purchase and installation of 10,000 tons of 112-lb. rail, $742,000; 400,000 7 x 9 9-lb. tie plates, and 60,000 7½ x 10½ tie plates, $108,000; 75,000 rail anchors, and other track material, $18,000; improvements to shops and engine houses, $36,800, and automatic block signals, $177,100.

BOLTS, NUTS, RIVETS

. . . Miscellaneous orders holding up well . . . Prices firmer

MISCELLANEOUS volume received by CLEVELAND bolt and nut producers has held up better than expected recently. The tendency toward firmer prices encourages hopes of producers for more satisfactory profits, even though orders are not as heavy as in November. Cap screw sales at CLEVELAND exceeded those of December and the month was very satisfactory from a profit standpoint. Producers continue operating at a good level despite the fact shipping schedules are reduced to the automotive industry. January tonnage of rivet producers also proved to be better than December.

At ST. LOUIS the demand for bolts, nuts and rivets has shown moderate but steady expansion since mid-December. Production has been stepped up slightly, and shipments are above expectations. Railroad shops are accounting for liberal tonnages and stove makers have increased their takings. Warehouses report a better demand from country machine shops and distributers.

WAREHOUSE BUSINESS

. . . January volume equals December's gains at few points

STEEL warehouse business at PITTSBURGH was slightly more active in January than in December. Demand was fairly well diversified, both as to products and consumers. Warehouse officials look for a seasonal pickup during February. At CLEVELAND, warehouse volume during January topped the like month of 1938 by 25 per cent. Against December, the month just closed proved comparable, except in the case of one distributer who received several large orders in December. Volume of business during January at DETROIT is rated the same as December's or, in some cases, approximately 10 per cent lower.

Meanwhile BOSTON finds that in contrast with most lines of business, including shelf hardware firms handling wire nails, etc., steel and heavy hardware and warehouses report business as exceptionally slow, not only running behind December, but January, 1937. Shops consuming bars, shapes, flats, etc., are buying fairly often, but in very small quantities. Extremely cold weather has deferred a great deal of small outside construction jobs involving steel products. Prices in the PHILADELPHIA territory have not changed for some months, and a few weak items such as reinforcing bars and galvanized sheets have strengthened perceptibly, there being now few concessions from published quotations. Turnover today is about on a par with the average for December, but there lately has been considerable improvement in number of small orders notwithstanding little

change in the total tonnage handled.

Volume of business at BUFFALO is 10 to 15 per cent greater than last year, warehousemen report. This estimate is a general one, including practically all commodities.

After getting off to an encouraging start early in the month, business in the New York district tapered sharply in the last two weeks of January. For the month as a whole, sales were just about equal to those of December. Specialty items were the most active products, with structural shapes about the slowest. A leading seller has taken galvanized sheets out of the quantity differential plan and has established a price of 4.50c. a lb. for lots of 1500 lb. or under.

REINFORCING BARS

. . . Boston water tunnel award goes to Bethlehem Steel

AN outstanding award in an otherwise dull week is a contract for 14,000 tons of bars and rods to be furnished for the Metropolitan District Water Supply at Boston by Bethlehem Steel Co., through Lock Joint Pipe Co., Ampere, N. J.

Specifications are off at PITTSBURGH and inquiries are less numerous. Concrete Steel Co. was awarded 800 tons of bars for the Westlake Housing project at Youngstown.

Distributers in the NEW YORK area have very little business before them, while in the PHILADELPHIA area the only large tonnage pending is that required by the Havre de Grace bridge and the market is spotty. The second section of the CHICAGO subway, requiring 2750 tons, is expected to be awarded within 10 days, with many jobs in that area hindered by heavy snows. Revision of plans for the subway's third section has cut the reinforcing tonnage by 700 tons to 2450 tons in all.

MERCHANT BARS

. . . Volume of business in January disappointing

HOT rolled bar orders at PITTSBURGH are fairly well diversified but aggregate tonnages booked in the past week are off slightly from the week before. Producers are somewhat disappointed in the total volume of business since the first of the year but are hopeful that larger releases from the automobile industry will materialize some time in February.

At CLEVELAND sales during January showed a gain over December, due largely to inventory replacements delayed until after the turn of the year.

Demand in the CHICAGO area consists chiefly of releases from tractor builders, forgers, jobbers and miscellaneous users. Farm implement production continues slow.

TUBULAR GOODS

. . . Louisiana pipe line of 4500 tons placed

THE Louisiana & Nevada Transit Co., Cotton Valley, La., has placed approximately 4500 tons, or 75 miles of 8⅝-in. pipe, with an unnamed pipe producer or producers. The line is for natural gas transmission from the local gas properties to Okay, Howard County, Arkansas.

Total pipe business in January at PITTSBURGH was moderately more active than December bookings, with improvements noticeable, especially in merchant pipe demand. Oil-country specifications are no greater than has been the case for the past several weeks.

January orders and shipments of CLEVELAND and YOUNGSTOWN producers exceeded December on all butt weld, lap weld, and electric weld classifications. The stiffening of merchant pipe prices has been gratifying to producers.

SHIPBUILDING

. . . Maritime commission awards 10 boats taking 43,700 tons steel

THE Maritime Commission has awarded contracts totaling $30,008,400 for the construction of 10 combination cargo-passenger vessels of the C-3 design. Total steel requirements are estimated at 43,700 tons.

Six of the ships will be constructed by the Newport News (Va.), Shipbuilding & Dry Dock Co., on its bid of $2,890,000 for each. The six are to be steam propelled.

The other four, to be diesel propelled, will be built by the Sun Shipbuilding & Dry Dock Co., of Chester, Pa., at $3,167,100 each.

The commission also opened bids last week on the construction of a 3000-ton steel cargo ship which will require about 1000 tons of steel. The apparent low bidder was the Ogdensburg Shipbuilding Co., Buffalo, whose bid was $285,000.

TIN PLATE

. . . Operations at 45 per cent . . . Buyers still cautious

OPERATIONS continue at approximately 45 per cent with producers still hopeful for increased activity during February. Although a fair rate of improvement in the volume of new business is confidently expected this month, there is no denying that buyers will remain conservative and cautious in making their commitments. Meanwhile, miscellaneous general line can requirements are showing further slight indications of expansion.

Weekly Bookings of Construction Steel

	Week Ended				Year to Date	
	Jan. 31, 1939	Jan. 24, 1939	Jan. 3, 1938	Feb. 1, 1938	1939	1938
Fabricated structural steel awards	22,450	21,800	36,100	18,400	122,350	69,200
Fabricated plate awards	10,755	2,175	475	9,075	24,275	14,315
Steel sheet piling awards	850	2,175	0	0	4,560	1,815
Reinforcing bar awards	21,515	10,500	1,400	6,955	63,420	23,515
Total Letting of Construction Steel..	55,570	36,650	37,975	34,430	214,605	108,845

REINFORCING STEEL

. . . Awards of 21,515 tons; 1865 tons in new projects.

NORTH ATLANTIC STATES
AWARDS

14,000 Tons, Boston, bars and rods, for metropolitan district water supply project, to Bethlehem Steel Co., Bethlehem, Pa., through Lock Joint Pipe Co., Ampere, N. J.

600 Tons, Bethesda, Md., National Institute of Health laboratory buildings and officers' quarters, to Bethlehem Steel Co., Bethlehem, Pa., through Charles H. Tompkins Co., Washington, contractor.

525 Tons, Carmel, N. Y., contract No. 321, Delaware Aqueduct, to Bethlehem Steel Co., Bethlehem, Pa., through Frazier-Davis Co.

500 Tons, Dayton, Pa., Mahoning dam, to Jones & Laughlin Steel Corp., Pittsburgh, through Dravo Corp., Pittsburgh, contractor.

400 Tons, Baltimore, Consolidated Gas & Electric plant, to Bethlehem Steel Co.

360 Tons, Delaware County, N. Y., mostly mesh, highway project RC-4010, to Bethlehem Steel Co., Bethlehem, Pa., through Mohawk Paving Co., Inc., Buffalo.

237 Tons, Sullivan County, N. Y., mostly mesh, highway project RC-4002, to Bethlehem Steel Co., Bethlehem, Pa., through Thomas A. Brogan, Yonkers, N. Y.

315 Tons, Monmouth County, N. J., highway project, route 4, section 40, to Igoe Bros., Newark, N. J., through Jannarone Contracting Co., Belleville, N. J.

225 Tons, Quantico, Va., officers' school, barracks and dispensary, to Jones & Laughlin Steel Corp., through Rosslyn Steel & Cement Co., Rosslyn, Va.; Charles H. Tompkins Co., contractor.

200 Tons, Bloomfield, N. J., high school, to Ceco Steel Products Corp., Jersey City, through Millimet Construction Co., New York.

195 Tons, Suffolk County, N. Y., mostly mesh, highway project RC-2553, to Bethlehem Steel Co., Bethlehem, Pa., through Gould & Kress, Inc., New York.

150 Tons, Mercer County, N. J., highway project, route 37, to Stulz-Sickles Co., Newark, through J. Nestor & Co., Newark.

124 Tons, Montgomery County, N. Y., Palatine bridge, to Bethlehem Steel Co., through McLean Construction Co., contractor.

100 Tons, Bangor, Me., police station and municipal garage, to Bancroft & Martin, Portland, Me., through C. E. Burton Co., contractor.

CENTRAL AND WESTERN STATES

1900 Tons, Indianapolis, stock yard pavilion, to American Bridge Co., Pittsburgh; Simmons Construction Co., Indianapolis, general contractor.

1003 Tons, Seattle, units 5 and 9, Lake Washington bridge, to Bethlehem Steel Co., Seattle, through Puget Construction Co., Seattle, contractor.

434 Tons, Delta, Cal., Central Valley project (Invitation 33056-A), to Columbia Steel Co., San Francisco.

247 Tons, Urbana, Ill., Gregory Hall, dormitory, to Laclede Steel Co., St. Louis, through William E. O'Neil Construction Co., Chicago.

PENDING REINFORCING BAR PROJECTS
ATLANTIC STATES

100 Tons, Buffalo, public school; bids close Feb. 28.

CENTRAL AND WESTERN STATES

1542 Tons, Mare Island, Cal., warehouse (revised tonnage); MacDonald & Kahn, San Francisco, low on general contract.

200 Tons, Grand Rapids, Mich., Woolworth store.

192 Tons, Santa Cruz, Cal., civic auditorium; bids Feb. 7.

190 Tons, Everett, Wash., bridge approach; bids Feb. 7.

180 Tons, Davenport, Iowa, school.

175 Tons, Lancaster, Ohio, community hotel.

158 Tons, Alameda, Cal., shop superstructure; bids in.

130 Tons, Los Angeles, United States Treasury, List 102; Judson Steel Co., Oakland, Cal., low at mill.

120 Tons, Thief River, Minn., school.

112 Tons, Lake County, Ore., highway work in Willamette National Forest for Bureau of Public Roads; bids Feb. 8.

107 Tons, Vallejo, Cal., gymnasium; David Paganini, San Francisco, contractor.

100 Tons, Park Rapids, Minn., school.

100 Tons, St. Paul, Minn., St. Thomas college.

Unstated tonnage, San Rafael, Cal., Dominican College building.

Unstated tonnage, Hawthorne, Nev., Navy ammunition depot; bids Feb. 8.

Unstated tonnage, Cottage Grove, Ore., school; Joseph H. Anderson, Portland, general contractor.

Unstated tonnage, South Bend, Inc., school; bids Feb. 3.

Unstated tonnage, Madison, Wis., State letting.

Unstated tonnage, Chicago, extension, R. R. Donnelley & Sons Co.; bids Feb. 2.

. GREAT BRITAIN .

. . . Political tension in Europe has retarded business

LONDON, Jan. 31, (By cable)—January proved disappointing, which was attributed mainly to the disturbed political situation in Europe and the Far East, while home demand is limited to hand-to-mouth buying and Government orders. Nor is there improvement in the Continental steel position. Even price inquiries have diminished. Confidence has been expressed by revived demand if European political tension is relaxed.

Tees January shipments of iron and steel are likely to be the lowest for any January in some years. Pig iron supplies are ample for current requirements.

Semi-finished steel output is increasing as more furnaces are started following air raid shelter sheet orders. Galvanized sheet works are preparing for full activity for at least three months.

Heavy steel is quiet as merchant shipbuilding is poor and railway programs are not expected to be released before spring. Argentine railways are inquiring for plain and corrugated black sheets. The quantities are not specified.

The tin plate market is improving with unfilled orders over 2,250,000 base boxes. There is a big demand for wasters, supplies being below production, and consumers who are unable to obtain regular sizes are taking what they can get.

The International Cold Rolled Sheet Cartel, comprising Germany, Belgium, Luxemburg and France, has been ratified and is in force till June 30, 1941.

Agreement has at last been reached between the British steel industry and the automobile industry for a cut in the price of sheet steel used in automotive vehicle production in the United Kingdom. Full details of the agreement has not been made public, but it is known that provision is made for loyalty and quantity rebates.

Magnet Lifts 1500 Times Own Weight

THE most powerful permanent magnet in the world, one that will lift nearly 1500 times its own weight, has been developed in the research laboratory of the General Electric Co. by W. E. McKibben.

The magnet weighs 1.85 gm., 1/250th of a pound, and has been made to lift 2750 gm. in tests. About half the size of an eraser on the end of a pencil, it will lift a 5-lb. flatiron with ease. The new magnet is several times as strong as those previously made.

The magnet is made of Alnico, an alloy of aluminum, nickel, cobalt and iron. Alnico is being used in radios, motors, generators and other electical equipment, replacing electro-magnets which require current. The new magnet utilizes a steel sheath around the Alnico pellet to direct the magnetic flux against the keeper or object being attracted. The steel jacket also protects the magnet against demagnetization when not in use.

Industrial Machinery Exports Climb in 1938

INDUSTRIAL machinery exports from the United States during 1938 were valued at $269,856,041, or 12 per cent greater than the 1937 foreign shipments valued at $240,449,734 and only 3 per cent below the record figure of $277,764,507 for 1929, the Machinery Division, Bureau of Foreign and Domestic Commerce, Department of Commerce reports.

Exports of power-driven metalworking machinery reached the peak value of $97,270,616, a 62 per cent gain over the 1937 figure of $59,880,376. Foreign sales in this group contributed importantly to the increase in the total industrial machinery export values. Machinery foreign shipments during December aggregated $24,210,186 compared with $24,122,242 in December, 1937.

J. H. Williams & Co., manufacturers of Superior drop-forgings and drop-forged tools, have moved their New York office from 75 Spring Street a block distant to 225 Lafayette Street, corner of Spring Street.

. . . NON-FERROUS . . .

. . . Lead prices here up $2 a ton on sharp advance in London . . . Further curtailment of copper output announced; prices harden . . . European political situation still the dominant market influence.

NEW YORK, Jan. 31.—Inside of less than a week, sentiment in the non-ferrous market, both here and abroad, has undergone a complete transition. A week ago the trend of foreign prices was definitely downward, but in the past two days this trend has been reversed and prices are climbing rapidly. This change in sentiment is attributed primarily to the lack of belligerence in Adolf Hitler's address on Monday. The foreign copper market in particular emphasized this change in market attitude. At the end of the past week, the foreign price was hovering around 10.075c. per lb., c.i.f. This morning sales were made in the neighborhood of 10.30c. The turnover also picked up. This morning's cartel sales totaled 6000 tons, the largest in some time. The domestic situation, however, has shown little tangible change, outside of higher asked prices in the open market. Sales for the week were about 4370 tons, bringing the total for the month through Saturday to 13,520 tons. Domestic producers' prices are unchanged at 11,25c. per lb., Connecticut Valley. Further curtailment of domestic copper output was indicated last week when the Phelps Dodge Corp. announced its intention to bring production in line with present consumption.

NON-FERROUS PRICES

Cents per lb. for early delivery

	Jan. 25	Jan. 26	Jan. 27	Jan. 28	Jan. 30	Jan. 31
Copper, Electrolytic[1]	11.25	11.25	11.25	11.25	11.25	11.25
Copper, Lake	11.375	11.375	11.375	11.375	11.375	11.375
Tin, Straits, New York	46.00	45.15	45.85	....	45.95	46.45
Zinc, East St. Louis[2]	4.50	4.50	4.50	4.50	4.50	4.50
Lead, St. Louis[3]	4.60	4.60	4.60	4.60	4.60	4.70

[1] Delivered Conn. Valley, deduct ¼c. for New York delivery. [2] Add 0.39c. for New York delivery. [3] Add 0.15c. for New York delivery.

Warehouse Prices

Base per lb., Delivered

	New York	Cleveland
Tin, Straits pig	47.375c.	50.00c.
Copper, Lake	12.25c.	12.375c.
Copper, electro	11.50c.	12.375c.
Copper, castings	11.25c.	11.875c.
*Copper sheets, hot-rolled	19.375c.	19.375c.
*High brass sheets	17.31c.	17.31c.
*Seamless brass tubes	20.06c.	20.06c.
*Seamless copper tubes	19.875c.	19.875c.
*Brass rods	12.62c.	12.62c.
Zinc slabs	6.25c.	7.00c.
Zinc sheets, No. 9 casks	10.50c.	12.10c.
Lead, American pig	5.60c.	5.60c.
Lead, bar	6.275c.	8.60c.
Lead, sheets, cut	8.00c.	8.00c.
Antimony, Asiatic	15.00c.	17.75c.
Alum., virgin, 99 per cent plus	22.50c.	22.50c.
Alum., No. 1 remelt., 98 to 99 per cent	19.50c.	19.50c.
Solder, ½ and ½	28.70c.	30.00c.
Babbitt metal, commercial grade	22.75c.	21.75c.

*** These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33 1/3; on brass sheets and rods, 40, and on brass and copper tubes, 25.**

Old Metals Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	8.00c.	8.75c.
Copper, hvy. and wire	7.00c.	7.50c.
Copper, light and bottoms	6.25c.	6.50c.
Brass, heavy	4.25c.	4.75c.
Brass, light	3.375c.	4.125c.
Hvy. machine composition	6.125c.	7.625c.
No. 1 yel. brass turnings	4.125c.	4.625c.
No. 1 red brass or compos. turnings	5.875c.	6.50c.
Lead, heavy	3.625c.	4.50c.
Cast aluminum	7.00c.	8.25c.
Sheet aluminum	11.75c.	13.25c.
Zinc	2.25c.	3.50c.

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered; virgin 99 per cent plus, 20c.-21c. a lb.; No. 12 remelt, No. 2 standard, 19c.-19.50c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt, New York; Asiatic, 14c. a lb., f.o.b.; American, 11.25c. a lb. QUICKSILVER, $80-$83 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 10.50c. a lb. lcl.

Lead

With the domestic price following the London price so closely, there was little surprise evidenced at the advance of 2 a ton today in domestic prices. This increase establishing prices at 4.85c. per lb. at New York, climaxed a week of fairly active buying of February metal. Consumers are still buying very closely to actual needs and consequently have about 50 per cent of their February needs yet to cover. Very little March lead has been booked. The London price, which laid the foundation for the advance here, was around 3.07c. per lb. this morning, as against 2.95c. a week ago.

Zinc

Consumers are continuing their policy of buying only sufficient metal to support current operations, and sales, consequently, continue very light. The week's total of prime Western bookings was 1366 tons against 1265 tons in the preceding week. Shipments for the week were 3327 tons, as compared with 3859 tons in the previous period. Domestic quotations, which remain unchanged at 4.89c. per lb., New York, were strengthened considerably by the rise in the London price from 2.83c. per lb. a week ago, to 2.90c. this morning.

Tin

A sharp break in the London market on Thursday, during which spot prices dropped £4 2s. 6d., frightened off most buyers in this market with the result that the week's business was very light. The decline abroad brought New York values down to 45.15c. per lb. on Straits metal, the lowest in about three months. However, the better tone which developed in all non-ferrous markets on Monday and Tuesday enabled prices to regain the lost ground. Today Straits tin in New York is priced at 46.45c. per lb., as against 46.25c. a week ago. An interesting feature of the week's business was the elimination of premiums on futures. At present prompt through June is selling at the same price.

IRON AND STEEL SCRAP

. . . Pittsburgh consumer purchases 23,000 tons, creating a shortage in that district . . . Composite declines 12½c. to $14.875.

JAN. 31—Although some consumers in the Pittsburgh district continue to pay as high as $16 for No. 1 steel, delivered, the leading operator in that area recently bought 23,000 tons of scrap, mostly No. 1, at an average price of $15.25. The quoted spread on No. 1 is therefore 75c., lowering the average 12½c. Together with the restoration of the former spread in the quoted price on the prime grade at Chicago, from $13.50 to $14, in place of a flat $14, and with unchanged prices at Philadelphia, the net result is a drop of 12½c. in the national composite figure, from $15 to $14.875.

Offsetting this technical decline is the fact that a large shortage now exists at Pittsburgh and, with operations pointing upward, there are obvious elements of strength in the market. In most other industrial centers, prices are unchanged. Restrictions on shipments are less at several points. Prices paid on February automotive lists are in line with previous quotations. Dealers look to February railroad lists for a clue to market trends, with strength already apparent in these grades at Pittsburgh.

The Japanese have again entered the American market, but bought in smaller lots at prices 50c. to $1 lower than at the end of December. As a result, dealer export buying prices are on the soft side.

Pittsburgh

After an absence from the market of over a year, the leading consumer last week purchased approximately 23,000 tons of scrap, the most of which was No. 1 heavy melting, at an average price of $15.25 a ton. A small portion of the order for a certain plant brought $15.50 a ton. Since the sale was made last week, brokers have been able to gain little headway in covering. Meanwhile, other points in the district during the past week have continued to pay as high as $16 a ton, delivered, for No. 1 heavy melting. For this week at least, quotation on No. 1 heavy melting steel becomes $15.25 to $16 a ton, a drop of 12½c. a ton from last week's composite average. The recent sale, plus other moderate purchases within the last few weeks, has created a large shortage in this district. One consumer in the district in the past few days has been offering $15.50 a ton freely for No. 1 steel and has been able to pick up only negligible amounts. Activity within the past few days has slowed down, which is not unusual in view of railroad lists closing this week. Meanwhile, railroad specialties are slightly higher on recent sales.

Chicago

A sale last week at $14 establishes that figure as the top quotation in this market at present. Brokers can buy freely at $13.75. The blizzard Monday in Chicago would disturb prices were demand strong, but at present little effect is noticeable, as necessary material is available.

Philadelphia

Even though district steel making operations here show no improvement, the slight rise in national operations has had a sympathetic effect in the eastern Pennsylvania area. The market, is of course, easy in view of the lack of buying, but prices show no weakness. A little steel is being bought to round out old orders and several small recent purchases, but present prices are not bringing out much steel, this being demonstrated by the fact that boats are held at Port Richmond for four or five days to fill out their cargoes. One boat cleared today and another is expected in within a week. Budd is now taking bids on 3000 tons of compressed bundles for February delivery. Prices offered will likely be little if any better than those that took the January list.

Youngstown

Embargoes which gave the market an easier tone temporarily are a little less stringent this week at some of the Valley consuming points. Meanwhile, principal quotations are unchanged, at least until the monthly railroad lists are out of the way. If dealers' buying prices in other nearby districts continue to hold up as they are this week, the market likely will retain its status quo. The New York Central offers around 4800 tons, bids closing Feb. 1, the Pennsylvania around 21,000. The Erie list also is to close Feb. 1.

Cleveland

One local mill provided a moderate amount of activity through the purchase of several thousand tons of mixed No. 1 and No. 2 at around $14. Pending the outcome of the railroad lists, which closed this week, and the possibility of additional activity, quotations remain unchanged. The defunct Lake Shore Electric Railway received bids Jan. 30 on about 19,000 tons of rails and several thousand tons of odds and ends. The non-ferrous scrap, approximately 800 tons, will be sold Feb. 7.

Buffalo

Although no sales of any size have been reported, the market is stronger this week. Mills are releasing a little more scrap and dealers are hopeful that the current rise in operations may be reflected in an increased demand. A small sale of machine shop turnings at less than quoted prices fixes the price of this commodity at $6.50 to $7 a ton.

St. Louis

Offerings of scrap have increased noticeably, giving the market an easier undertone. Buying is practically nil as industries are hesitant pending clarification of European political and domestic industrial situations. Some mills are in need of supplies but will not meet dealers' views on prices. Some price reductions have been recorded, mainly adjustments. Accurate values are hard to estimate in absence of sales. Shipments to industries continue in large volume. Railroad lists: Chicago & Alton, 829 tons; Nickel Plate, 1090 tons; Baltimore & Ohio, 6982; Pennsylvania, 19,140; Chicago, Milwaukee & St. Paul, 200.

Cincinnati

While the local scrap market has a tone of uncertainty, dealers' bids are unchanged and anticipations are still strong. Material is moving on contract with a few fill-in orders for urgencies. One mill is apparently interested in material, but is exerting pressure on prices. Foreign disturbances and stock market gyrations tend to unsettle the market.

New York

The Japanese have again entered the market, but the tonnages placed were small in comparison with the amounts involved in late December purchases and prices ran anywhere from 50c. to $1 lower. As a result, dealer buying prices for export material are softer and a decline is indicated by a 50c. spread in the downward direction from heretofore flat prices. Opinion is divided as to whether the European cartel will enter the American market in February. Domestic sales are light, but there is a small flow of material to eastern Pennsylvania mills.

Boston

The export market has quieted down as certain shippers have withdrawn and prices are easier. No sale of No. 1 steel was made the past week at more than $13.50 a ton, delivered dock, and no offer for No. 2 was made at more than $12.50. Recent top prices were 50c. a ton higher. The domestic market is quiet and unchanged. Brokers are offering $3.38 a ton on cars for regular steel turnings and $4.10 for short ones, but requirements are small. New England foundry buying of machinery cast is quiet at $12.50 to $14 a ton, delivered, price depending on freight rate. Sale of abandoned rails in Massachusetts by the New Haven Railroad is held up by a court decision reversing a previous court ruling. However, the company recenty sold to Chicago and New York interests, at a price not disclosed, 7000 tons located in hurricane-struck sections of Massachusetts and Rhode Island.

Detroit

Closing of bids on a list by Chrysler Corp. on Monday indicated that scrap buying prices were generally unchanged from the level of previous weeks. On the following days other automotive lists were scheduled to close. The heavy blizzard which swept over the area Monday halted yard activity.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$15.25 to	$16.00
Railroad hvy. mltng...	16.50 to	17.00
No. 2 hvy. mltng. steel.	14.25 to	14.75
Scrap rails	17.00 to	17.50
Rails 3 ft. and under..	18.00 to	18.50
Comp. sheet steel	15.25 to	16.00
Hand bundled sheets..	14.50 to	15.00
Hvy. steel axle turn..	14.00 to	14.50
Machine shop turn....	10.00 to	10.50
Short shov. turn.....	10.50 to	11.00
Mixed bor. & turn.....	....	8.75
Cast iron borings.....	....	8.75
Cast iron carwheels...	15.00 to	15.50
Hvy. breakable cast...	12.50 to	13.00
No. 1 cupola cast.....	15.25 to	15.75
RR. knuckles & cplrs.	17.50 to	18.00
Rail coil & leaf springs	18.00 to	18.50
Rolled steel wheels....	18.00 to	18.50
Low phos. billet crops.	18.50 to	19.00
Low phos. punchings.	17.50 to	18.00
Low phos. plate	17.00 to	17.50

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$15.00 to	$15.50
No. 2 hvy. mltng. steel.	13.00 to	13.50
Hydraulic bund., new.	14.50 to	15.00
Hydraulic bund., old..	11.50 to	12.00
Steel rails for rolling.	17.00 to	17.50
Cast iron carwheels...	16.50 to	17.00
Hvy. breakable cast...	....	16.00
No. 1 cast.....	16.50 to	17.00
Stove plate (steel wks.)	13.00 to	13.50
Railroad malleable ...	15.50 to	16.00
Machine shop turn....	8.50 to	9.00
No. 1 blast furnace....	6.50 to	7.00
Cast borings	6.50 to	7.00
Heavy axle turnings..	10.00 to	10.50
No. 1 low phos. hvy...	....	17.00
Couplers & knuckles..	....	17.00
Rolled steel wheels...	....	17.00
Steel axles	21.50 to	22.00
Shafting	20.50 to	21.00
Spec. iron & steel pipe	12.00 to	12.50
No. 1 forge fire	11.00 to	11.50
Cast borings (chem.)..	9.50 to	10.00

CHICAGO

Delivered to Chicago district consumers:

	Per Gross Ton	
Hvy. mltng. steel.....	$13.50 to	$14.00
Auto. hvy. mltng. steel alloy free	12.00 to	12.50
No. 2 auto. steel	11.50 to	12.00
Shoveling steel	13.50 to	14.00
Factory bundles	12.50 to	13.00
Dealers' bundles	12.00 to	12.50
Drop forge flashings..	10.00 to	10.50
No. 1 busheling	12.00 to	12.50
No. 2 busheling, old..	5.75 to	6.25
Rolled carwheels	15.00 to	15.50
Railroad tires, cut....	15.00 to	15.50
Railroad leaf springs..	15.25 to	15.75
Steel coup. & knuckles	14.50 to	15.00
Axle turnings	12.50 to	13.00
Coil springs	16.00 to	16.50
Axle turn. (elec.)	13.75 to	14.25
Low phos. punchings.	15.50 to	16.00
Low phos. plates 12 in. and under	15.00 to	15.50
Cast iron borings	5.25 to	5.75
Short shov. turn.	7.00 to	7.50
Machine shop turn....	6.50 to	7.00
Rerolling rails	17.00 to	17.50
Steel rails under 3 ft..	15.75 to	16.25
Steel rails under 2 ft..	16.25 to	16.75
Angle bars, steel	15.25 to	15.75
Cast iron carwheels...	12.25 to	12.75
Railroad malleable	15.00 to	15.50
Agric. malleable	11.25 to	11.75
	Per Net Ton	
Iron car axles	18.50 to	19.00
Steel car axles	18.00 to	18.50
Locomotive tires	14.50 to	15.00
Pipes and flues	9.00 to	9.50
No. 1 machinery cast.	12.50 to	13.00
Clean auto. cast.	13.00 to	13.50
No. 1 railroad cast....	11.25 to	11.75
No. 1 agric. cast.....	10.25 to	10.75
Stove plate	7.75 to	8.25
Grate bars	8.00 to	8.50
Brake shoes	9.25 to	9.75

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$15.50 to	$16.00
No. 2 hvy. mltng. steel.	14.50 to	15.00
Low phos. plate	16.00 to	16.50
No. 1 busheling	14.50 to	15.00
Hydraulic bundles	14.75 to	15.25
Machine shop turn....	9.75 to	10.25

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$14.00 to	$14.50
No. 2 hvy. mltng. steel.	13.50 to	14.00
Comp. sheet steel	13.50 to	14.00
Light bund. stampings	11.00 to	11.50
Drop forge flashings..	13.00 to	13.50
Machine shop turn....	7.00 to	7.50
Short shov. turn.....	7.50 to	8.00
No. 1 busheling	13.00 to	13.50
Steel axle turnings....	11.00 to	11.50
Low phos. billet and bloom crops	18.00 to	18.50
Cast iron borings	7.75 to	8.25
Mixed bor. & turn....	7.75 to	8.25
No. 2 busheling	7.75 to	8.25
No. 1 cast	16.50 to	17.00
Railroad grate bars ..	9.50 to	10.00
Stove plate	10.00 to	10.50
Rails under 3 ft.	19.00 to	19.50
Rails for rolling	17.00 to	17.50
Railroad malleable ...	15.50 to	16.00
Cast iron carwheels ..	14.00 to	14.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$14.00 to	$14.50
No. 2 hvy. mltng. steel.	12.00 to	12.50
Scrap rails	15.00 to	15.50
New hvy. b'ndled sheets	12.00 to	12.50
Old hydraul. bundles..	10.75 to	11.25
Drop forge flashings...	12.00 to	12.50
No. 1 busheling	12.00 to	12.50
Hvy. axle turnings....	10.50 to	11.00
Machine shop turn....	6.50 to	7.00
Knuckles & couplers..	16.50 to	17.00
Coil & leaf springs....	16.50 to	17.00
Rolled steel wheels....	16.00 to	16.50
Low phos. billet crops.	15.50 to	16.00
Shov. turnings	8.75 to	9.25
Mixed bor. & turn.....	7.50 to	8.00
Cast iron borings	7.50 to	8.00
Steel car axles	16.50 to	17.00
No. 1 machinery cast..	15.50 to	16.00
No. 1 cupola cast.	14.50 to	15.00
Stove plate	13.00 to	13.50
Steel rails under 3 ft..	18.00 to	18.50
Cast iron carwheels...	13.50 to	14.00
Railroad malleable	15.00 to	15.50
Chemical borings	9.00 to	9.50

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting.	$13.00 to	$13.50
No. 1 hvy. melting....	12.50 to	13.00
No. 2 hvy. melting....	12.00 to	12.50
No. 1 locomotive tires.	13.50 to	14.00
Misc. stand. sec. rails.	14.50 to	15.00
Railroad springs	15.50 to	16.00
Bundled sheets	7.50 to	8.00
No. 1 busheling	7.50 to	8.00
Cast. bor. & turn.....	2.50 to	3.00
Machine shop turn....	3.50 to	4.00
Heavy turnings	9.50 to	10.00
Rails for rolling.....	17.00 to	17.50
Steel car axles	18.50 to	19.00
No. 1 RR. wrought....	10.50 to	11.00
No. 2 RR. wrought....	12.50 to	13.00
Steel rails under 3 ft..	16.25 to	16.75
Steel angle bars	14.50 to	15.00
Cast iron carwheels...	14.50 to	15.00
No. 1 machinery cast..	15.00 to	15.50
Railroad malleable ...	12.00 to	12.50
No. 1 railroad cast....	12.75 to	13.00
Stove plate	9.00 to	9.50
Grate bars	9.00 to	9.50
Brake shoes	10.00 to	10.50

CINCINNATI

Dealers' buying prices per gross ton at yards:

No. 1 hvy. mltng. steel.	$11.50 to	$12.00
No. 2 hvy. mltng. steel.	9.25 to	9.75
Scrap rails for mltng.	15.25 to	15.75
Loose sheet clippings.	6.75 to	7.25
Hydrau. b'ndled sheets	11.00 to	11.50
Cast iron borings	3.50 to	4.00
Machine shop turn....	5.25 to	5.75
No. 1 busheling	8.00 to	8.50
No. 2 busheling	2.75 to	3.25
Rails for rolling	17.50 to	18.00
No. 1 locomotive tires.	14.25 to	14.75
Short rails	18.00 to	18.50
Cast iron carwheels...	12.75 to	13.25
No. 1 machinery cast.	13.50 to	14.00
No. 1 railroad cast....	12.75 to	13.25
Burnt cast	6.75 to	7.25
Stove plate	6.75 to	7.25
Agricul. malleable	11.75 to	12.25
Railroad malleable	14.25 to	14.75
Mixed hvy. cast.....	10.50 to	11.00

BIRMINGHAM

Per gross ton delivered to consumer:

Hvy. melting steel....	$12.50 to	$14.00
Scrap steel rails	14.50 to	15.00
Short shov. turnings..	7.50 to	8.10
Stove plate	9.00 to	10.00
Steel axles	15.00 to	16.00
Iron axles	15.00 to	16.00
No. 1 RR. wrought	....	10.00
Rails for rolling	16.00 to	16.50
No. 1 cast.	....	14.50
Tramcar wheels	....	14.00

DETROIT

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. industrial steel	$10.50 to	$11.00
No. 2 hvy. mltng. steel.	9.50 to	10.00
Borings and turnings.	5.75 to	6.25
Long turnings	5.50 to	6.00
Short shov. turnings..	6.00 to	6.50
No. 1 machinery cast..	12.25 to	12.75
Automotive cast	13.50 to	14.00
Hvy. breakable cast...	9.75 to	10.25
Hydraul. comp. sheets.	11.75 to	12.25
Stove plate	8.00 to	8.50
New factory bushel...	10.75 to	11.25
Sheet clippings	8.25 to	9.25
Flashings	9.50 to	10.00
Low phos. plate scrap	12.00 to	12.50

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel.	$10.50 to	$11.00
No. 2 hvy. mltng. steel.	9.00 to	9.50
Hvy. breakable cast...	$11.50 to	12.00
No. 1 machinery cast.	11.50 to	12.00
No. 2 cast	9.50 to	10.00
Stove plate	9.50 to	10.00
Steel car axles	20.00 to	20.50
Shafting	15.50 to	16.00
No. 1 RR. wrought....	11.00 to	11.50
No. 1 wrought long....	9.50 to	10.00
Spec. iron & steel pipe	9.00 to	9.50
Rails for rolling	16.00 to	16.50
Clean steel turnings*..	4.00 to	4.50
Cast borings*	3.50 to	4.00
No. 1 blast furnace...	3.50 to	4.00
Cast borings (chem.)..	9.50 to	10.00
Unprepared yard scrap	6.00 to	6.50
Light iron	3.00 to	3.50
Per gross ton, delivered local foundries:		
No. 1 machn. cast†....	$13.50 to	$14.00
No. 2 cast†	10.50 to	11.00

* $1.50 less for truck loads.
† Northern N. J. prices are $2 to $2.50 higher.

BOSTON

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel.....	Nominal	
Scrap rails	Nominal	
No. 2 steel	Nominal	
Breakable cast	$10.15	
Machine shop turn....	....	3.38
Mixed bor. & turn....	$2.00 to	2.25
Bun. skeleton long....	....	8.15
Shafting	15.50 to	15.65
Cast bor. chemical....	5.50 to	5.75
Per gross ton delivered consumers' yards:		
Textile cast	$12.50 to	$14.00
No. 1 machine cast....	12.50 to	14.00

PACIFIC COAST

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$12.50 to	$14.00
No. 2 hvy. mltng. steel.	11.50 to	13.00

CANADA

Dealers' buying prices at their yards, per gross ton:

	Toronto	Montreal
No. 1 hvy. mltng. steel.	$9.50	$9.00
No. 2 hvy. mltng. steel.	8.00	7.50
Mixed dealers steel....	7.00	6.50
Scrap pipe	5.50	5.00
Steel turnings	4.50	4.00
Cast borings	3.50	3.00
Machinery cast	15.00	14.00
Dealers cast	13.00	12.00
Stove plate	11.00	10.50

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barges		
No. 1 hvy. mltng. steel.	$12.00 to	$12.50
No. 2 hvy. mltng. steel.	10.50 to	11.00
No. 2 cast	10.50 to	11.00
Stove plate	9.50 to	10.00
Boston on cars at Army Base or Mystic Wharf		
No. 1 hvy. mltng. steel.....	$13.50	
No. 2 hvy. mltng. steel.....	12.50	
Rails (scrap)	13.50	
Philadelphia, delivered alongside boats, Port Richmond		
No. 1 hvy. mltng. steel.	$14.50 to	$15.00
No. 2 hvy. mltng. steel.	13.50 to	14.00

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

(Prices are f.o.b. unless otherwise indicated)

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are $2 higher. F.o.b. Duluth, billets only, $2 higher.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Gross Ton
Pittsburgh, Chicago or Cleveland	$43.00
Worcester, Mass.	45.00
Birmingham	43.00
San Francisco	52.00

Rods over 9/32 in. or 47/64 in., inclusive, $5 a ton over base.

SOFT STEEL BARS

	Base per Lb.
Pittsburgh, Chicago, Gary, Cleveland, Buffalo and Birmingham	2.25c.
Detroit, delivered	2.35c.
Duluth	2.35c.
Philadelphia, delivered	2.57c.
New York	2.59c.
On cars dock Gulf ports	2.60c.
On cars dock Pacific ports	2.85c.

RAIL STEEL BARS

(For merchant trade)

Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham	2.10c.
On cars dock Tex. Gulf ports	2.45c.
On cars dock Pacific ports	2.70c.

BILLET STEEL REINFORCING BARS

(Straight lengths as quoted by distributers)

Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Cleveland, Youngstown or Sparrows Pt.	1.90c. to 2.05c.
Detroit, delivered	2.00c. to 2.15c.
On cars dock Tex. Gulf ports	2.25c. to 2.40c.
On cars dock Pacific ports	2.50c.

RAIL STEEL REINFORCING BARS

(Straight lengths as quoted by distributers)

Pittsburgh, Chicago, Gary, Buffalo, Cleveland, Youngstown or Birmingham	1.75c. to 1.90c.
Detroit, delivered	1.85c. to 2.00c.
On cars dock Tex. Gulf ports	2.10c. to 2.25c.
On cars dock Pacific ports	2.35c.

Prices on reinforcing bars have been subject to concessions of $3 a ton or more from above quotations.

IRON BARS

Chicago and Terre Haute	2.15c.
Pittsburgh (refined)	3.60c.

COLD FINISHED BARS AND SHAFTING*

	Base per Lb.
Pittsburgh, Buffalo, Cleveland, Chicago and Gary	2.70c.
Detroit	2.75c.

* In quantities of 10,000 to 19,999 lb.

PLATES

	Base per Lb.
Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont, Del.	2.10c.
Philadelphia, del'd	2.15c.
New York, del'd	2.29c.
On cars dock Gulf ports	2.45c.
On cars dock Pacific ports	2.60c.
Wrought iron plates, P't'g	3.80c.

FLOOR PLATES

Pittsburgh or Chicago	3.35c.
New York, del'd	3.71c.
On cars dock Gulf ports	3.70c.
On cars dock Pacific ports	3.95c.

STRUCTURAL SHAPES

	Base per Lb.
Pittsburgh, Chicago, Gary, Buffalo, Bethlehem or Birmingham	2.10c.
Philadelphia, del'd	2.215c.
New York, del'd	2.27c.
On cars dock Gulf ports	2.45c.
On cars dock Pacific ports	2.70c.

STEEL SHEET PILING

	Base per Lb.
Pittsburgh, Chicago or Buffalo	2.40c.
On cars dock Gulf ports	.285c.
On cars dock Pacific ports	2.90c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton	$40.00
Angle bars, per 100 lb.	2.70

F.o.b. Basing Points

Light rails (from billets) per gross ton	$40.00
Light rails (from rail steel) per gross ton	39.00

	Base per Lb.
Cut spikes	3.00c.
Screw spikes	4.55c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast ports	2.25c.
Track bolts, to steam railroads	4.15c.
Track bolts to jobbers, all sizes (per 100 counts)	65-5

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS

Hot Rolled

	Base per Lb.
Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown or Chicago	2.15c.
Detroit, delivered	2.25c.
Philadelphia, delivered	2.32c.
Granite City	2.25c.
On cars dock Pacific ports	2.65c.
Wrought iron, Pittsburgh	4.25c.

Cold Rolled*

Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown or Chicago	3.20c.
Detroit, delivered	3.30c.
Granite City	3.30c.
Philadelphia, delivered	3.52c.
On cars dock Pacific ports	3.80c.

* Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base.

Galvanized Sheets, 24 Gage

Pittsburgh, Chicago, Gary, Sparrows Point, Buffalo, Middletown, Youngstown or Birmingham	3.50c.
Philadelphia, delv'd	3.67c.
Granite City	3.60c.
On cars dock Pacific ports	4.00c.
Wrought iron Pittsburgh	6.10c.

Electrical Sheets

(*F.o.b. Pittsburgh*)

	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Special Motor	4.95c.
Special Dynamo	5.65c.
Transformer	6.15c.
Transformer Special	7.15c.
Transformer Extra Special	7.65c.

Silicon Strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

Long Ternes

No. 24 unassorted 8-lb. coating f.o.b. Pittsburgh or Gary	3.95c.
F.o.b. cars dock Pacific ports	4.65c.

Vitreous Enameling Stock, 20 Gage*

Pittsburgh, Chicago, Gary, Youngstown, Middletown or Cleveland	3.35c.
Detroit, delv'd	3.45c.
Granite City	3.45c.
On cars dock Pacific ports	3.95c.

TIN MILL PRODUCTS

***Tin Plate**

	Per Base Box
Standard cokes, Pittsburgh, Chicago and Gary	$5.00
Standard cokes, Granite City	5.10

* Prices effective Nov. 10 on shipments through first quarter of 1939.

Special Coated Manufacturing Ternes

	Per Base Box
Granite City	$4.40
Pittsburgh or Gary	4.30

Roofing Terne Plate

(*F.o.b. Pittsburgh*)

(Per Package, 112 sheets, 20 x 28 in.)	
8-lb. coating I.C.	$13.00
15-lb. coating I.C.	14.00
20-lb. coating I.C.	15.00
25-lb. coating I.C.	16.00
30-lb. coating I.C.	17.25
40-lb. coating I.C.	19.50

Black Plate, 29 gage and lighter

Pittsburgh, Chicago and Gary	3.05c.
Granite City	3.15c.
On cars dock Pacific ports, boxed	4.00c.

HOT ROLLED STRIP

(*Widths up to 12 in.*)

	Base per Lb.
Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown or Birmingham	2.15c.
Detroit, delivered	2.25c.

Cooperage Stock

Pittsburgh & Chicago	2.25c.

COLD ROLLED STRIP*

	Base per Lb.
Pittsburgh, Youngstown or Cleveland	2.95c.
Chicago	3.05c.
Detroit, delivered	3.05c.
Worcester	3.15c.

* Carbon 0.25 and less.

Commodity Cold Rolled Strip

Pittsburgh, Youngstown, or Cleveland	3.10c
Detroit, delivered	3.20c.
Worcester	3.50c.

COLD ROLLED SPRING STEEL

		Pittsburgh and Cleveland	Worcester
Carbon	0.26-0.50%	2.95c.	3.15c.
Carbon	.51 .75	4.30c.	4.50c.
Carbon	.76-1.00	6.15c.	6.35c.
Carbon	1.01 to 1.25	8.35c.	8.55c.

WIRE PRODUCTS

Carload lots, f.o.b. Pittsburgh, Chicago, Cleveland and Birmingham)

To Manufacturing Trade

	Per Lb.
Bright wire	2.60c.
Galvanized wire, base	2.65c.*
Spring wire	3.20c.

* On galvanizing wire to manufacturing trade, size and galvanizing extras are charged, the price Nos. 6 to 9 gage, inclusive, thus being 3.15c.

To the Trade

	Base per Keg
Standard wire nails	$2.45
Coated nails	2.45
Cut nails, carloads	3.60

	Base per 100 Lb.
Annealed fence wire	$2.95
Galvanized fence wire	3.35
Polished staples	3.15
Galvanized staples	3.40
Twisted barbless wire	3.20
Woven wire fence, base column.	67
Single loop bale ties, base col...	56
Stand. 2 pt., 12.5 gage barbed cattle wire, per 80 rod spool..	$2.54

Note: Birmingham base same on above items, except spring wire.

Add $4 a ton for Mobile, Ala.; $5 for New Orleans; $6 for Lake Charles to above bases, except on galvanized and annealed merchant fence wire, which are $1 a ton additional in each case.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel			*Wrought Iron*		
In.	Black	Galv.	In.	Black	Galv.
⅛	56	36	¼ & ⅜	.+ 9	+30
¼ to ⅜	.59	43½	½	24	6½
½	....63½	54	¾	30	13
¾	....66½	58	1 & 1¼	..34	19
1 to 3	..68½	60½	1½	38	21½
			2	....37½	21

Lap Weld

2	61	52½	2	....30½	15
2½ & 3	..64	55½	2½ to 3½	31½	17½
3½ to 6	.66	57½	4	....33½	21
7 & 8	..65	55½	4½ to 8	.32½	20
9 & 10	..64½	55	9 to 12	..28½	15
11 & 12	..63½	54			

Butt weld, extra strong, plain ends

⅛	....54½	41½	¼ & ⅜	.+10	+43
½ to ⅝	.56½	45½	½	25	9
½	....61½	53½	¾	31	15
¾	....65½	57½	1 to 2	...38	22½
1 to 3	...67	60			

Lap weld, extra strong, plain ends

2	59	51½	2	....33½	18½
2½ & 3	63	55½	2½ to 4.39	1½	25½
3½ to 6.66	1½	59	4½ to 6.37	1½	24
7 & 8	..65½	56	7 & 8	..38½	24½
9 & 10	..64½	55	9 to 12	..32	20½
11 & 12	..63½	54			

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher, on all butt weld 8 in. and smaller.

Boiler Tubes

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall.

(Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld Hot Rolled
1 in. o.d....13 B.W.G.	$ 9.01	$ 7.82	....
1¼ in. o.d...13 B.W.G.	10.67	9.26	....
1½ in. o.d...13 B.W.G.	11.79	10.23	$9.72
1¾ in. o.d...13 B.W.G.	13.42	11.64	11.06
2 in. o.d....13 B.W.G.	15.03	13.04	12.38
2¼ in. o.d...13 B.W.G.	16.76	14.54	13.79
2¼ in. o.d...12 B.W.G.	18.45	16.01	15.16
2½ in. o.d...12 B.W.G.	20.21	17.54	16.58
2¾ in. o.d...12 B.W.G.	21.42	18.59	17.54
3 in. o.d....12 B.W.G.	22.48	19.50	18.35
3½ in. o.d...11 B.W.G.	28.37	24.62	23.15
4 in. o.d....10 B.W.G.	35.20	30.54	28.66
4½ in. o.d...10 B.W.G.	43.04	37.35	35.22
5 in o.d..... 9 B.W.G	54.01	46.87	44.25
6 in. o.d..... 7 B.W.G.	82.93	71.96	68.14

Extras for less carload quantities:

40,000 lb. or ft. over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

CAST IRON WATER PIPE

	Per Net Ton
*6-in. and larger, del'd Chicago.	$51.00
6-in. and larger, del'd New York	49.00
*6-in. and larger, Birmingham.	43.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles....	52.00
F.o.b. dock, Seattle	52.00
4-in. f.o.b. dock, San Francisco or Los Angeles	55.00
F.o.b. dock, Seattle	52.00

Class "A" and gas pipe, $3 extra 4-in. pipe is $3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $42, Birmingham, and $50 delivered Chicago and 4-in. pipe, $45, Birmingham, and $54 delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine and carriage bolts: ½ in. & 6 in. and smaller.	65, 5 and 5*
Larger and longer up to 1 in.	60, 10 and 5*
1⅛ in. and larger	60, 5 and 5*
Lag bolts	60, 10 and 5
Plow bolts, Nos. 1, 2, 3 and 7	65, 5 and 5
Hot pressed nuts, and c.p.c. and t nuts, square or hex. blank or tapped: ½ in. and smaller	65 and 5
9/16 in. to 1 in. inclusive.	60, 5 and 5
1⅛ in. and larger	60 and 5

* Less carload lots and less than full container quantity. Less carload lots in full container quantity, an additional 10 per cent discount; carload lots and full container quantity, still another 5 per cent discount.

Semi-fin. hexagon nuts	U.S.S.	S.A.E.
½ in. and smaller	65-5	70
9/16 to 1 in.	60-10	65
1⅛ in. and larger	60-5	60-5

In full container lots, 10 per cent additional discount.

Stove bolts in packages, nuts attached 75

Stove bolts in packages, with nuts separate 75 and 12½

Stove bolts in bulk 85

On stove bolts freight is allowed to destination on 200 lb. and over.

Large Rivets

(½-in. and larger)

Base per 100 Lb.

F.o.b. Pittsburgh, Cleveland Chicago, Birmingham $3.40

Small Rivets

(7/16-in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham 65 and 10

Cap and Set Screws

(Freight allowed to destination)

Per Cent Off List

Milled hexagon head, cap screws, 1 in. dia. and smaller 50 and 10

Milled square head set screws, case hardened, 1 in. dia. and smaller 73 and 10

Milled headless set screws, cut thread ¾ in. and smaller 68 and 10

Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller 65 and 10

Upset set screws, cup and oval points 73 and 10

Milled studs 57 and 10

Alloy and Stainless Steel

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.

Base price, $56.00 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade, base	2.80c.
Delivered, Detroit	2.90c.

S.A.E. Series Numbers	Alloy Differential per 100 Lb.
200 (½% Nickel)	$0.35
2100 (1½% Nickel)	$0.75
2300 (3½% Nickel)	1.55
2500 (5% Nickel)	2.35
3100 Nickel-chromium	0.70
3200 Nickel-chromium	1.85
3300 Nickel-chromium	3.80
3400 Nickel-chromium	3.20
4100 Chromium-molybdenum (0.15 to 0.25 Molybdenum)	0.55
4100 Chromium-molybdenum (0.25 to 0.40 Molybdenum)	0.75
4600 Nickel - molybdenum (0.20 to 0.30 Mo. 1.50 to 2.00 Ni.)	1.10
5100 Chrome steel (0.60-0.90 Cr.)	0.35
5100 Chrome steel (0.80-1.10 Cr.)	0.45
5100 Chromium spring steel	0.15
6100 Chromium-vanadium bar	1.20
6100 Chromium-vanadium spring steel	0.85
Chromium-nickel vanadium	1.50
Carbon-vanadium	0.85

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.40c. base per lb. Delivered Detroit, 3.50c., carlots

CORROSION & HEAT RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chrome-Nickel

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25c.	24c.
Plates	29c.	27c.
Structural shapes.	25c.	24c.
Sheets	36c.	34c.
Hot-rolled strip	23.50c.	21.50c.
Cold-rolled strip	30c.	28c.
Drawn wire	25c.	24c.

Straight Chrome

	No. 410	No. 430	No. 442	No. 446
Bars	18.50c.	19c.	22.50c.	27.50c.
Plates	21.50c.	22c.	25.50c.	30.50c.
Sheets	26.50c.	29c.	32.50c.	36.50c.
Hot Strip	17c.	17.50c.	23c.	28c.
Cold stp.	22c.	22.50c.	28.50c.	36.50c.

TOOL STEEL

High speed	67c.
High-carbon-chrome	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher

British and Continental

BRITISH

Per Gross Ton
f.o.b. United Kingdom Ports

Ferromanganese, export	Nominal
Tin plate, per base box	20s. 3d.
Steel bars, open hearth.	£10 8s.
Beams, open-hearth	£10
Channels, open-hearth	£10 5s.
Angles, open-hearth	£10
Black sheets, No. 24 gage.	£13
Galvanized sheets, No. 24 gage	£15 15s.

CONTINENTAL

Per Gross Ton, Gold £, f.o.b. Continental Ports

Billets, Thomas	Nominal
Wire rods, No. 5 B.W.G.	£5 10s.
Steel bars, merchant	£5 5s.
Sheet bars	Nominal
Plate ¼ in. and up	£5 7s.
Plate 3/16 in. and 5 mm.	£5 13s.
Sheet ⅛ in.	£5 9s. 6d.
Beams, Thomas	£4 18s.
Angles (Basic)	£4 18s.
Hoops and strip, base	£5 12s.

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass.	$22.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md.	$22.00
Delivered Brooklyn	24.50
Delivered Newark or Jersey City	23.53
Delivered Philadelphia	22.84
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown	21.00
F.o.b. Buffalo	21.00
F.o.b. Detroit	21.00
Southern, delivered Cincinnati	21.06
Northern, delivered, Cincinnati	21.44
F.o.b. Duluth	21.50
F.o.b. Provo, Utah	19.00
Delivered, San Francisco, Los Angeles or Seattle	24.50
F.o.b. Birmingham*	17.38

* Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of 0.70 per cent and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same, except at Birmingham and Provo, which are not malleable iron basing points.

Basic

F.o.b. Everett, Mass.	$22.25
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	21.50
F.o.b. Buffalo	20.00
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown	20.50
Delivered Philadelphia	22.34
Delivered Canton, Ohio	21.89
Delivered Mansfield, Ohio	22.44
F.o.b. Birmingham	16.00

Bessemer

F.o.b. Buffalo	$22.00
F.o.b. Everett, Mass.	23.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa.	23.00
Delivered Newark or Jersey City	24.53
Erie, Pa., and Duluth	22.00
F.o.b. Neville Island, Toledo, Chicago and Youngstown	21.50
F.o.b. Birmingham	22.00
Delivered Cincinnati	22.11
Delivered Canton, Ohio	22.89
Delivered Mansfield, Ohio	23.44

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.	$26.50

Gray Forge

Valley or Pittsburgh furnace	$20.50

Charcoal

Lake Superior furnace	$25.00
Delivered Chicago	28.34

Canadian Pig Iron

Per Gross Ton

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$26.50
No. 2 fdy., sil. 1.75 to 2.25	25.50
Malleable	26.00
Basic	25.50

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$27.50
No. 2 fdy., sil. 1.75 to 2.25	27.00
Malleable	27.50
Basic	27.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload)	$80.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%	$28.00
Domestic, 26 to 28%	33.00

Electric Ferrosilicon

Per Gross Ton Delivered; Lump Size

50% (carload lots, bulk)	$69.50*
50% (ton lots in 50 gal. bbl.)	80.50*
75% (carload lots, bulk)	126.00*
75% (ton lots in 50 gal. bbl.)	139.00*

Bessemer Ferrosilicon

F.o.b. Furnace, Jackson, Ohio

Per Gross Ton

10.00 to 10.50%	$30.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2%, $1 per ton additional. Phosphorus 0.75% or over, $1 per ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton

F.o.b. Jackson, Ohio, 5.00 to 5.50%	$24.50

For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots, Lump Size, on Contract

4 to 6% carbon	10.50c.*
2% carbon	16.50c.*
1% carbon	17.50c.*
0.10% carbon	19.50c.*
0.06% carbon	20.00c.*

Silico-manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon	$83.00
2.50% carbon	88.00
2% carbon	93.00
1% carbon	103.00

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carloads	$1.75
Ferrotungsten, 100 lbs. and less	2.00
Ferrovanadium, contract, per lb. contained V., delivered	$2.70 to $2.90†
Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., tons lots.	$2.25†
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton	$142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton	$157.50
Ferrophosphorus, electric or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, electrolytic, 23-26% in car lots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross ton, $3 unitage, freight equalized with Nashville	$75.00
Ferromolybdenum, per lb. Mo. f.o.b. furnace	95c.
Calcium molybdate, per lb. Mo. f.o.b. furnace	80c.

*Spot prices are $5 per ton higher
†Spot prices are 10c. per lb. of contained element higher.

ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, Bessemer, 51.50%	$5.25
Old range, non-Bessemer, 51.50%	5.10
Messabi, Bessemer, 51.50%	5.10
Messabi, non-Bessemer, 51.50%	4.95
High phosphorus, 51.50%	4.85

Foreign Ore

C.i.f. Philadelphia or Baltimore

Per Unit

Iron, low phos., copper free, 55 to 58% dry, Algeria	12c.
Iron, low phos., Swedish, average, 68½% iron	12c.
Iron, basic or foundry, Swedish, aver. 65% iron	11c.
Iron, basic or foundry, Russian, aver. 65% iron	Nominal
Man., Caucasian, washed 52%	31c.
Man., African, Indian, 44-48%	29c.
Man., African, Indian, 49-51%	31c.
Man., Brazilian, 46 to 48½%	28c.

Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered	$19.50
Tungsten, domestic, scheelite delivered	$18.00 to $19.00
Chrome ore (lump) c.i.f. Atlantic Seaboard, per gross ton: South African (low grade)	$15.00
Rhodesian, 45%	19.00
Rhodesian, 48%	23.00
Turkish, 48-49%	23.00
Turkish, 45-46%	19.00
Turkish, 40-44%	16.00
Chrome concentrates (Turkish) c.i.f. Atlantic Seaboard, per gross ton: 50%	$24.00
48-49%	22.50

FLUORSPAR

Per Net Ton

Domestic washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail	$17.00 to $18.00
Domestic, f.o.b. Ohio River landing barges	18.00
No. 2 lump, 85-5, f.o.b. Kentucky and Ill. mines	18.00
Foreign, 85% calcium, fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	24.50
Domestic No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	31.50

FUEL OIL

Per Gal.

No. 2, f.o.b., Bayonne	4.25c.
No. 6, f.o.b., Bayonne	2.26c.
No. 5 Bur. Stds., del'd Chicago	3.25c.
No. 6 Bur. Stds., del'd Chicago	2.75c.
No. 3 distillate, del'd Cleve'd	5.50c.
No. 4 industrial, del'd Cleve'd	5.25c.
No. 5 industrial, del'd Cleve'd	3.00c.
No. 6 industrial, del'd Cleve'd	2.75c.

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, Prompt	$3.75
Foundry, f.o.b. Connellsville, Prompt	$4.75 to 5.50
Foundry, by-product, Chicago ovens	10.25
Foundry, by-product, del'd New England	12.50
Foundry, by-product, del'd Newark or Jersey City	10.88 to 11.40
Foundry, by-product, Philadelphia	10.95
Foundry, by-product, delivered Cleveland	10.30
Foundry, by-product, delivered Cincinnati	9.75
Foundry, Birmingham	7.50
Foundry, by-product, del'd St. Louis industrial district	10.75 to 11.00
Foundry, from Birmingham, f.o.b. cars dock Pacific ports	14.75

IRON AND STEEL WAREHOUSE PRICES

PITTSBURGH*

	Base per Lb.
Plates	3.55c.
Shapes	3.55c.
Soft steel bars and small shapes	3.60c.
**Reinforcing steel bars	2.70c.
Cold finished bars and screw stock	3.95c.
Hot rolled strip	3.75c.
Hot rolled sheets	3.50c.
Galv. sheets (24 ga.) 500 lb. to 1499 lb.	4.50c.
Wire, black, soft annealed	3.15c.
Wire, galv., soft	3.55c.
Track spikes ½ in. and smaller (1 to 24 kegs)	3.40c.
Wire nails (in 100-lb. kegs)	2.65c.

On plates, structurals, bars, strip and hot rolled sheets, base applied to orders of 400 to 1999 lb.

** On reinforcing bars base applies to orders of less than one ton and includes switching and carting charge.

* All above prices for delivery within the Pittsburgh switching district.

NEW YORK

	Base per Lb.
Plates, ¼ in. and heavier	3.76c.
Structural shapes	3.75c.
Soft steel bars, round	3.94c.
Iron bars, Swed. char-coal	7.50 to 8.25c
Cold-fin. shafting and screw stock:	
Rounds, squares, hexagons	4.39c.
Flats up to 12 in. wide	4.39c.
Cold-rolled strip, soft and quarter hard	3.66c.
Hot-rolled strip, soft O.H.	4.11c.
Hot-rolled sheets (10 ga.)	3.73c.
Galv. sheets (24 ga.)	4.50c.
Long ternes (24 ga.)	5.50 to 6.20c.
Cold-rolled sheets (20 ga.)	
Standard quality	4.90c.
Deep drawing	5.15c.
Stretcher leveled	5.50c.
SAE, 2300, hot-rolled	7.50c.
SAE, 3100, hot-rolled	6.10c.
SAE, 6100, hot-rolled annealed	10.25c.
SAE, 2300, cold-rolled	8.69c.
SAE, 3100, cold-rolled, annealed	7.29c.
Floor plate, ⅛ in. and heavier	5.43c.
Standard tool steel	12.50c.
Wire, black, annealed (No. 9)	4.65c.
Wire, galv. (No. 9)	5.00c.
Open-hearth spring steel	4.75c. to 10.25c.
Common wire nails, per keg in 25 keg lots	$3.25

CHICAGO

	Base per Lb.
Plates and structural shapes	3.55c.
Soft steel bars, rounds and angles	3.60c.
Soft steel squares, hexagons, channels and Tees	3.75c.
Hot rolled strip	3.75c.
Floor plates	5.15c.
Hot rolled sheets	3.50c.
Galvanized sheets	4.50c.
Cold rolled sheets	4.45c.
Cold finished carbon bars	4.05c.

Above prices are subject to deductions and extras for quantity and are f.o.b. consumer's plant within Chicago free delivery zone.

CLEVELAND

	Base per Lb.
Plates	3.55c.
Structural shapes	3.73c.
Soft steel bars	3.50c.
Reinfor. bars (under 2000 lb.)†	2.55c.
Cold-fin. bars (1000 lb., over)	4.05c.
Hot-rolled strip	3.65c.
Cold rolled sheets	4.70c.
Cold-finished strip	3.35c.
Galvanized sheets (No. 24)	4.62c.
Hot-rolled sheets	3.50c.
Floor plates, 3/16 in. and heavier	5.33c.
*Black ann'l'd wire, per 100 lb.	$3.10
*No. 9 galv. wire, per 100 lb.	3.50
*Com. wire nails, base per keg	2.60
Hot rolled alloy steel (3100)	6.05c.
Cold rolled alloy steel (3115)	6.85c.

* For 5000 lb. or less.
† 500 lb. base quantity.

Prices shown on hot rolled bars, strip, sheets, shapes and plates are for 400 to 1999 lb. Alloy steel, 1000 lb. and over; galvanized sheets, 150 to 1499 lb.; cold rolled sheets, 399 lb. and under.

ST. LOUIS

	Base per Lb.
Plates and structural shapes	3.82c.
Bars, soft steel (rounds and flats)	3.87c.
Bars, soft steel (squares, hexagons, ovals, half ovals and half rounds)	4.02c.
Cold fin. rounds, shafting, screw stock	4.32c.
Galv. sheets (24 ga.)	4.77c.
Hot rolled sheets	3.77c.
Galv. corrugated sheets, 24 ga. and heavier*	4.82c.
Structural rivets	5.02c.

* No. 26 and lighter take special prices.

BOSTON

	Base per Lb.
Structural shapes, 3 in. and larger	5.85c.
Plates, ¼ in. and heavier	3.85c.
Bars	3.98c.
Heavy hot rolled sheets	3.86c.
Hot rolled sheets	4.21c.
Hot rolled annealed sheets	4.76c.
Galvanized sheets	4.76c.
Cold rolled sheets	4.93c.

The following quantity differentials apply: Less than 100 lb., plus $1.50 per 100 lb.; 100 to 399 lb. plus 50c.; 400 to 1999 lb. base; 2000 to 9999 lb. minus 20c.; 10,000 to 39,999 lb. minus 30c.; 40,000 lb. and over minus 40c.

BUFFALO

Plates	3.77c.
Floor plates	5.40c.
Struc. shapes	3.55c.
Soft steel bars	3.60c.
Reinforcing bars (20,000 lb. or more)	2.05c.
Cold-fin. flats, squares, rounds, and hex.	4.05c.
Hot-rolled sheets, 3/16 x 14 in. to 48 in. wide incl. also sizes No. 8 to 30 ga.	3.50c.
Galv. sheets (24 ga.)	4.50c.
Bands and hoops	3.97c.

NEW ORLEANS

	Base per Lb.
Mild steel bars	4.20c.
Reinforcing bars	3.24c.
Structural shapes	4.10c.
Plates	4.10c.
Hot-rolled sheets, No. 10	4.35c.
Steel bands	4.75c.
Cold-finished steel bars	5.10c.
Structural rivets	4.85c.
Boiler rivets	4.85c.
Common wire nails, base per keg	3.55
Bolts and nuts, per cent off list	60

REFRACTORIES PRICES

Fire Clay Brick

	Per 1000 f.o.b. Works
Super-duty brick, at St. Louis	$60.80
First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois	47.50
First quality, New Jersey	52.50
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	42.75
Second quality, New Jersey	49.00
No. 1, Ohio	39.90
Ground fire clay, per ton	7.10

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$40.00
Chicago District	49.00
Birmingham	40.00
Silica cement per net ton (Eastern)	8.55

Chrome Brick

	Net per Ton
Standard f.o.b. Baltimore, Plymouth Meeting and Chester	$47.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	47.00

Magnesite Brick

	Net per Ton
Standard f.o.b. Baltimore and Chester	$67.00
Chemically bonded, f.o.b. Baltimore	57.00

Grain Magnesite

	Net per Ton
Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	$45.00
Domestic, f.o.b. Baltimore and Chester, in sacks	40.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	3.40c.
*Structural shapes	3.40c.
*Soft steel bars, small shapes, iron bars (except bands)	3.60c.
‡Reinforc. steel bars, square and deformed	2.61c.
Cold-finished steel bars	4.36c.
*Steel hoops	4.10c.
*Steel bands, No. 12 and 3/16 in. incl.	3.60c.
*Spring steel	4.75c.
†Hot-rolled anneal. sheets	3.10c.
†Galvanized sheets (No. 24)	4.50c.
*Diam. pat. floor plates, ¼ in.	5.00c.

These prices are for delivery in Philadelphia trucking area.

*Base prices subject to deduction on orders aggregating 4000 lb. or over.

†For 25 bundles or over.

‡For one to five tons.

BIRMINGHAM

Bars and bar shapes	$3.85 base		
Structural shapes and plates	3.75	"	
Hot rolled sheets No. 10 ga.	3.80	"	
Hot rolled sheets No. 24 ga.	4.40	"	3500 lb. and over
Galvanized sheets No. 24 ga.	5.05	"	3500 lb. or more
Strip	4.05	"	
Reinforcing bars.	3.85	"	
Floor plates	5.96	"	
Cold finished bars	4.91	"	
Machine and carriage bolts	50 & 10 off list		
Rivets (structural)	$4.60 base		

On plates, shapes, bars, hot-rolled strip heavy hot-rolled sheets, the base applies on 400 to 3999 lb. All prices are f.o.b. consumer's plant.

PACIFIC COAST

	Base per Lb.		
	San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	4.00c.	4.00c.	4.05c.
Shapes, standard	4.00c.	4.00c.	4.05c
Soft steel bars	4.05c.	4.00c.	4.30c
Reinforcing bars, f.o.b. cars dock Pacific ports	2.675c.	open.	2.975c.
Hot-rolled sheets (No. 10)	4.00c.	4.20c.	3.95c.
Galv. sheets (No. 24 and lighter)	5.15c.	5.05c.	5.25c.
Galv. sheets (No. 22 and heavier)	5.40c.	5.05c.	5.25c.
Cold-finished steel Rounds	6.55c.	6.60c.	7.10c.
Squares and hexagons	7.80c.	7.85c.	7.10c.
Flats	8.30c.	8.35c.	8.10c.
Common wire nails—base per keg less carload	$3.20	$3.05	$3.00

All items subject to differentials for quantity.

ST. PAUL

	Base per Lb.
Mild steel bars, rounds	4.10c.
Structural shapes	4.00c.
Plates	4.00c.
Cold-finished bars	4.83c.
Hot-rolled annealed sheets, No. 24	4.75c.
Galvanized sheets, No. 24	5.00c.

On mild steel bars, shapes and plates the base applies on 400 to 14,999 lb. On hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over. Base on cold-finished bars is 1000 lb. and over of a size.

MEMPHIS

	Base per Lb.
Mild steel bars	4.01c.
Shapes, bar size	4.01c.
Iron bars	4.01c.
Structural shapes	3.96c.
Plates	3.96c.
Hot-rolled sheets	3.91c.
Galvanized sheets, No. 24	5.26c.
Steel bands	4.16c.
Cold-drawn rounds	4.61c.
Cold-drawn flats, squares, hexagons	6.61c.

PLANT EXPANSION AND EQUIPMENT BUYING

NORTH ATLANTIC

A.P.W. Paper Co., Albany, N. Y., manufacturer of tissue paper stocks, is concluding arrangements for purchase of land at Jacksonville, Fla., for new paper mill for general production, storage and distribution, with power house, machine shop and other mechanical departments. Cost over $1,000,000 with machinery.

Superintendent of Lighthouses, St. George, Staten Island, New York, asks bids until Feb. 6 for four cast steel mushroom anchors, each about 5000 lb. (Circular 58740).

Construction Service, Veterans' Administration, Washington, asks bids until Feb. 28 for power house equipment at institution in Bronx, New York, including boilers, boiler plant equipment, fuel oil storage tank, radial brick stack, gas and electric service lines, steam piping, etc.

Scheinert Brothers, Inc., 276 East Houston Street, New York, hardware, has purchased seven-story and basement building at 137-41 Prince Street, totaling about 35,000 sq. ft. of floor space, for new storage and distributing plant. Present plant will be removed to new location early in March.

Board of Education, Union Free School District No. 28, Hempstead, L. I., plans manual training department in new three-story junior-senior high school at Long Beach, for which general contract has just been let to Chapman-Kruge Engineering Co., 155 East Forty-second Street, New York. Cost about $625,000. Wilson & Rahm, 140 East Thirty-ninth Street, New York, are architects.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 7 for bonded lead-lined steel tubing (Schedule 5480) for Brooklyn and Philadelphia Navy yards; sand mullers for foundry use (Schedule 5428) for Brooklyn and Boston yards; until Feb. 10, steel hexagon nuts (Schedule 5407) for Brooklyn and Mare Island yards; three arc welding machines (Schedule 5441) for Brooklyn yard.

Park & Tilford Distillers, Inc., 548 West Forty-fourth Street, New York, plans extensions in whiskey distillery at Louisville, formerly plant of Bonnie Brothers Distilling Co., for new mechanical-bottling division. Cost over $60,000 with equipment. Francis McDonald is superintendent at plant.

Commanding Officer, Ordnance Department, Watervliet Arsenal, Watervliet, N. Y., asks bids until Feb. 7 for one motor-driven trolley to operate an electric hoist (Circular 131); until Feb. 8, one tool and cutter grinding machine (Circular 129).

City Council, Watervliet, N. Y., asks bids until Feb. 23 for equipment for a municipal garbage and refuse incinerator plant. Solomon & Keis, 257 Broadway, Troy, N. Y., are consulting engineers.

Quartermaster, Fort Hamilton, Brooklyn, asks bids until Feb. 9 for one valve refacer machine (Circular 381-15).

Signal Property Office, Signal Corps, Laboratories, Fort Monmouth, N. J., asks bids until Feb. 7 for five steel drawing tables (Circular 11).

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until Feb. 7 for fabricating 40 sheet steel fin assemblies for 1000-lb. bombs, and for four similar fin assemblies for 500-lb. bombs (Circular 538).

Ace Baling Wire Co., 1025 Germantown Avenue, Philadelphia, manufacturer of wire goods, has purchased four-story building at 433-37 York Avenue, and will convert into a two-story structure for company occupancy.

Commanding Officer, Ordnance Department, Frankford Arsenal, Philadelphia, asks bids until Feb. 6 for 10 sections of a fully gravity-operated conveyor, capable of handling bar stock from 1½ to 3⅝-in. diameter, each section 10 ft. (Circular 682).

OHIO AND INDIANA

Cleveland Pneumatic Tool Co., 3734 East Seventy-eighth Street, Cleveland, plans one-story addition, totaling about 16,000 sq. ft. of floor space. Cost over $70,000 with equipment. Ernest McGeorge, East Ninety-third Street and Quincy Avenue, is consulting engineer.

American Heliocopter Corp., Toledo, Ohio, has been organized by interests connected with Willys-Overland Motors, Inc., Wolcott Boulevard, Toledo, headed by George W. Ritter, secretary, to manufacture airplanes and parts. It is understood that company will arrange for space at automobile works of Willys-Overland for development of new type of aircraft, parts production and assembling. Howell French, formerly sales promotion manager of Willys-Overland, will be president of new company.

Thew Shovel Co., Lorain, Ohio, manufacturer of steam shovels and parts, and other heavy machinery, has let general contract to T. J. Hume, 435 Hamilton Avenue, for two-story addition, 28 x 35 ft., and small one-story extension. Cost close to $40,000 with equipment. Silsbee & Smith, Elyria, Ohio, are architects.

Contracting Officer, Materiel Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until Feb. 6 for steel tape armored cable and insulated lead-covered cable (Circular 590), 14 multiple mercury manometer assemblies, one instrument testing water manometer assembly, and one instrument testing mercury manometer assembly (Circular 607), 52 oil spray guns and 33 oil tanks, each 2-gal. capacity (Circular 612); until Feb. 7, connectors, elbows, nipples and tees (solderless) (Circular 604); until Feb. 8, three motor-drive units for grinders (Circular 603); until Feb. 9, cargo anchor tube plate nuts, ring assemblies, ring cups, and ring brackets, elastic stop nut plates (Circular 609).

Standard Railway Equipment Co., Columbia Avenue, Hammond, Ind., has let general contract to Stewart O. Strandberg, 37 West Van Buren Street, Chicago, for two-story and basement addition, 85 x 135 ft. Cost close to $85,000 with equipment. F. J. Hoffman, Racine, Wis., is architect.

NEW ENGLAND

Autowyre Mfg. Co., Oakville, Conn., manufacturer of wire goods, metal stampings, etc., has asked bids on general contract for one-story addition, 60 x 200 ft., in part for storage and distribution. Traveling cranes and other mechanical-handling equipment, and air-conditioning system will be installed. Cost over $75,000 with machinery. At same time company will build new boiler house, 40 x 60 ft. Fletcher-Thompson, Inc., 1336 Fairfield Avenue, Bridgeport, Conn., is architect and engineer.

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until Feb. 6 for two automatic, multi-tool turning lathes (Circular 259), one special two-way hydraulic-feed turning, facing and chamfering machine (Circular 258), one automatic medium milling machine (Circular 261); until Feb. 7, shaving tool cutters (Circular 262), two automatic milling machines (Circular 266); until Feb. 8, 10,000 cleaning brushes (Circular 263), 132 bench legs (Circular 279).

Bridgeport Brass Co., East Main Street, Bridgeport, Conn., brass, bronze and copper wire goods, tubing, etc., has let general contract to Poirot Construction Co., 2001 West Pershing Road, Chicago, for one-story factory branch, storage and distributing plant, 150 x 160 ft., on site recently leased at St. Louis Avenue and Forty-seventh Place, Chicago. Cost close to $80,000 with equipment. Chicago offices are at 3635 South Iron Street.

WASHINGTON DIST.

Purchase Section, National Bureau of Standards, Washington, asks bids until Feb. 9 for one hydraulic floor-type testing machine for compression and transverse testing work, capacity 600,000 lb. in compression.

Johnson Machine Co., Wytheville, Va., manufacturer of machinery and parts, plans one-story building, 80 x 200 ft., on West Main Street, for storage and distribution. Cost about $45,000 with equipment.

General Purchasing Officer, Panama Canal, Washington, asks bids until Feb. 6 for equipment for steam power plant at Gorgas hospital, Ancon, Canal Zone, including two boiler units with accessories, two oil burners with controls, two fuel oil-preheaters, two injectors, two feed pumps, two feedwater regulators, one motor-driven condensation return pump, two low-water cutouts, two steam-type water heaters, 18 steam traps, piping, etc. (Schedule 3419); until Feb. 10, 10,000 lin. ft. galvanized steel wire poultry netting, 6000 ft. galvanized steel wire cloth, malleable iron fittings, crane chain, pipe diestocks, carbon steel twist drills, galvanized wire rope clips, machinists' vises, pipe hangers, valves, ferrules and other equipment (Schedule 3420).

Cleaners Hanger Co., 5301 Grand River Boulevard, Detroit, manufacturer of wire clothes hangers and other wire goods, has acquired one-story building at 3500 Boston Street, Baltimore, for new branch plant.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 10 for six fluid pressure scales, with self-contained motor and snap switch, for testing pressure gages (Schedule 5439) for Newport, R. I., naval station; two horizontal, cylinder-type chain tumbling mills and one dust-collecting system (Schedule 5440); until Feb. 14, one motor-driven core box machine for patternmaker's use (Schedule 5463) for Boston Navy Yard; electric controllers for motors, magnetic brakes, reducers and spare parts (Schedule 5457); until Feb. 17, two hydaulic pumping units, four hydraulic motors and spare parts (Schedule 5473) for Philadelphia yard; until Feb. 21, seamless steel tubing (Schedule 5484), fuel oil heaters and spare parts (Schedule 5472) for Boston, Charleston and Puget Sound yards.

SOUTHWEST

Barnsdall Tripoli Corp., Seneca, Mo., manufacturer of pumice stone and other abrasive products, has let general contract to Muskogee Iron Works, Muskogee, Okla., for one-story finishing mill near Miami, Okla., equipment installation to include crushers, pulverizers, tube mill, screening equipment, mechanical-drying apparatus and other machinery. Cost close to $100,000 with equipment. Company is a subsidiary of Barnsdall Oil Co., 120 Broadway, New York.

Board of Directors, Grand River Dam Authority, City Hall, Vinita, Okla., asks bids until Feb. 14 for new transmission line from site of hydro-electric power plant on Grand River, near Pensacola, Okla., now in course of construction, through Grand River valley area to Markham and Port Gibson, about 56 miles. Holway & Neuffer, 302 East Eighteenth Street, Tulsa, Okla., are consulting engineers.

National Battery Co., 2315 Pine Street, St. Louis, electric storage batteries and parts, has let general contract to S. W. Jenkins, 536 North Avenue, N.E., Atlanta, Ga., for initial unit of new branch plant at East Point, near Atlanta, 100 x 200 ft., with extension, 42 x 110 ft. Cost close to $150,000 with equipment.

Board of Education, Iola, Kan., will begin foundations at once for new one and two-story vocational arts school, 74 x 120 ft., for which general contract recently was let to Huff Construction Co., 915 Jefferson Street. Cost over $125,000 with equipment. Lorentz Schmidt, 1805 East Second Street, Wichita, Kan., is architect.

City Council, Timpson, Tex., plans extensions and improvements in municipal electric light and power plant, and waterworks station, including additional equipment. Cost about $75,000. Municipal Engineering & Finance Co., Mercantile Building, Dallas, Tex., is consulting engineer.

Quality Beverage Co., 1319 Continental Street, Houston, Tex., has leased one-story building, 40 x 150 ft., to be erected by Graham Realty Co., Houston, at 1015 Sampson Street, for which general contract has just been let to P. M. Marshall, 943 Euclid Avenue. It will be used for mechanical-bottling, storage and distribution. Cost over $45,000 with equipment.

SOUTH ATLANTIC

Monarch Elevator & Machine Co., 431 Morehead Avenue, Greensboro, N. C., manufacturer of elevators, parts and other mechanical equipment, has acquired property on Westover Terrace for new one-story plant, superstructure to begin soon. Cost close to $45,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 10 for 15 pneumatic tail wheel assemblies for airplanes (Schedule 900-2328) for Pensacola, Fla., naval air station.

Smith's Heating System, Inc., Kinston, N. C., manufacturer of oil-burning heating equipment, is arranging for sale of common stock to total $250,000, considerable part of proceeds to be used for expansion in plant facilities and equipment.

BUFFALO DISTRICT

Crucible Steel Co. of America, Inc., 104 Magnolia Avenue, Syracuse, N. Y., will take bids soon on general contract for one-story addition to mill on Emerson Avenue. Cost over $400,000 with equipment.

United States Engineer Office, Federal Building, Buffalo, asks bids until Feb. 14 for one shot core drill and pumping unit, with full equipment and accessories (Circular 96).

New York State Electric & Gas Corp., Ithaca, N. Y., has authorized a bond issue of $500,000, proceeds to be used for extensions in power lines in several counties and other distribution system work. Project will be carried out in spring.

WESTERN PA. DIST.

H. J. Heinz Co., 1062 Progress Street, Northside, Pittsburgh, food canner and packer, plans one-story addition to branch plant of Leamington, Ont., and improvements in present factory units. Cost over $100,000 with equipment.

City Council, Oil City, Pa., plans expansion in municipal Splane Memorial Airport, including hangar unit, shop, night lighting installation and other work. Cost close to $100,000. It is proposed to arrange financing soon. Oil City Aero Club is interested in project.

Pennsylvania Coal & Coke Co., Marstellar (Cambria County), Pa., has plans for new tipple at local coal-mining properties recently destroyed by fire. Cost close to $50,000 with equipment. Company offices are at Cresson, Pa., A. L. Hunt, general manager, in charge.

Board of Public Education, Administration Building, Pittsburgh, has let general contract to Navarro Corp., 6219 Broad Street, for two-story and basement addition to South Side vocational school. Cost about $465,000 exclusive of equipment.

SOUTH CENTRAL

Wesix Electric Heater Co., 390 First Street, San Francisco, manufacturer of electric heaters and parts, is concluding negotiations for property at Chattanooga, Tenn., for new branch plant, primarily for assembling operations.

Canada Dry Bottling Co., New Orleans, care of D. E. Hite, Room 333, St. Charles Hotel, architect, has asked bids on general contract for one-story mechanical-bottling works. Cost close to $50,000 with equipment.

United States Engineer Office, Memphis, Tenn., asks bids until Feb. 7 for cast steel spuds and cast steel extensions (Circular 192-F).

Norton Coal Corp., Nortonville, Ky., plans rebuilding tipple at local mining properties, recently destroyed by fire. Loss close to $40,000 with equipment.

Godchaux Sugars, Inc., Masonic Temple Building, New Orleans, has rejected bids recently received for one-story addition to cane sugar mill at Raceland, La., 100 x 145 ft., including modernization and improvements in present plant. New bids are scheduled to be asked soon. Cost over $80,000 with equipment. George P. Rice, Baronne Building, New Orleans, is consulting engineer.

MIDDLE WEST

Sanitary District of Chicago, 910 South Michigan Avenue, Chicago, Harry E. Wallace, acting clerk, asks bids until Feb. 9 for sewage pumping station equipment for Racine Avenue plant of sewage system, including motor-driven sewage pumps and accessories, heating boilers, vacuum pumps and air compressor, traveling crane, mechanically-cleaned bar screens, duplex sump pumps, heating and ventilating systems, air and water lines, etc.

Archer-Daniels-Midland Co., Minneapolis, Minn., manufacturer of linseed oil and allied products, has selected tract at Decatur, Ill., for new plant for general production, with storage and distributing buildings, tank department and other operating divisions. A power house is planned. Plant will be given over to soy bean processing and will cost close to $1,000,000 with machinery.

Town Council, Akron, Iowa, asks bids until Feb. 14 for extensions and improvements in municipal electric power plant, including new diesel engine-generating unit and auxiliary equipment.

Coca-Cola Bottling Co., Humboldt, Iowa, has let general contract to Kucharo Construction Co., Des Moines, Iowa, for one-story addition to mechanical-bottling, storage and distributing plant. Cost about $80,000, of which approximately one-half will be expended for equipment. Wetherell & Harrison, Shops Building, Des Moines, are architects.

City Council, Sibley, Iowa, asks bids until Feb. 8 for extensions and improvements in municipal electric power plant, including new 750-kw. steam turbo-generator unit and accessories, surface condenser, cooling tower and other equipment. Cost about $150,000. Young & Stanley, Inc., Muscatine, Iowa, is consulting engineer.

Constructing Quartermaster, Fort Snelling, Minn., asks bids until Feb. 6 for pipe rails, ornamental steel railings, pipe trench frame and cover, cast iron garbage rack frames, etc. (Circular 6142-21).

City Council, Madison, Minn., will take bids soon for extensions and improvements in municipal electric power plant, including new 2500-kw. diesel engine-generating unit and accessories, to replace present worn-out equipment, 350-hp. boiler, coal and ash-handling equipment, and auxiliaries. Cost over $180,000. Perkins & McWayne, Paulton Block, Sioux Falls, S. D., are consulting engineers.

Meili-Blumberg Corp., New Holstein, Wis., has started work on factory addition, 60 x 120 ft., part two stories and basement, to cost $30,000 with equipment.

Kearney & Trecker Corp., 6771 West National Avenue, West Allis, Milwaukee, has placed general contract with Klug & Smith Co., 111 East Wisconsin Avenue, for factory addition, 80 x 100 ft., one-story, costing about $35,000 with equipment. Firm manufactures milling machines and other machine tools.

Crucible Steel Casting Co., 2850 South Twentieth Street, Milwaukee, has increased its authorized capitalization from $325,000 to $625,000 for general corporate purposes and to provide for enlargement of foundry and equipment.

Wisconsin Electric Power Co., 231 West Michigan Street, Milwaukee, has appropriated $2,500,000 for replacements, improvements and additions to power plants this year. Gould W. Van Derzee is vice-president and general manager.

MICHIGAN DISTRICT

Consumers Power Co., Jackson, Mich., will resume construction of John C. Weadock steam-electric generating plant at mouth of Saginaw River, near Bay City, Mich., as part of 1939 expansion and improvement program, installation to include two 35,000-kw. turbo-generator units and accessories, high-pressure boilers and auxiliary equipment. Work on station was discontinued last summer. Company also will install another steam turbo-generating unit at Bryce E. Morrow generating station on Kalamazoo River, near Comstock, Mich., with high-pressure boilers and other equipment. Both projects will include extensions in transmission lines for connection with present high-tension system. Cost over $6,500,000.

American Porcelain Enamel Co., Muskegon, Mich., recently organized with capital of $100,000, has work under way on new plant for production of enamel frit, particularly for sheet steel enameling service. N. J. Workman is president, and E. C. Farmer, secretary.

PACIFIC COAST

General Petroleum Co. of California, 417 Montgomery Street, San Francisco, has let general contract to William Radtke, 180 Eigleberry Street, Gilroy, Cal., for new bulk oil storage and distributing plant at Gilroy, with pumping station, steel tanks and other operating facilities. Cost close to $60,000 with equipment. General contract for a similar bulk plant near Soledad, Cal., has been let to F. N. Franscioni, Soledad. Cost about $75,000 with pumping station, steel tanks and other equipment.

Stuart Oxygen Co., 211 Bay Street, San Francisco, manufacturer of industrial oxygen, hydrogen, etc., is arranging for purchase of land in Vernon district, Los Angeles, for new branch plant, including tank storage and distributing facilities. Cost close to $75,000 with equipment.

Bureau of Reclamation, Denver, asks bids until Feb. 8 for a radial-gate hoist for operation of a radial gate installed in headworks of Roza diversion dam, Roza division, Yakima, Wash., project (Specifications 1178-D), two motor-driven gate hoists for operating two 110-ft. roller gates at Roza diversion dam (Specifications 822); until Feb. 9, seven revolving fish screens and one additional roller chain for headworks of Yakima Ridge canal at Roza diversion dam (Specifications 1179-D).

Coca-Cola Co., 963 East Fourth Street, Los Angeles, has asked bids for three-story and basement addition, 120 x 120 ft., to general manufacturing plant, including modernizing and improving an existing three-story and basement building, 80 x 120 ft., at 934 East Fourth Street. Cost over $175,000 with equipment. W. P. Weisiger, first noted address, is resident engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 10 for one motor-driven precision bench lathe (Schedule 5446); until Feb. 14, about 250,000 lb. of copper-nickel-alloy condenser tubes (Schedule 5437); until Feb. 17, 288 cylinders with closing valves, for use with hydrogen gas, 299 cylinders for similar purpose and 288 cylinders additional (Schedule 5453) for Mare Island Navy Yard; copper-nickel alloy tubing (Schedule 5449) for San Diego Naval Air Station; until Feb. 21, two gasoline engine-driven industrial-type tractors (Schedule 5474) for San Pedro (Los Angeles) Naval Station; one motor-driven combination metal band saw (Schedule 5467) for Puget Sound Navy Yard.

FOREIGN

Societa Cellulosa d'Italia, Rome, Italy, plans new pulp mill on large tract at Cuneo, Italy, with power house, pumping station, machine shop and other mechanical departments. Mill will be used for production of sulphate pulp for paper and rayon industries. Cost over $1,000,000 with machinery.

THIS WEEK'S MACHINE ...TOOL ACTIVITIES...

. . . Cincinnati builders report moderate increase in domestic orders . . . Undertone continues strong in other centers.

Moderate Increase Reported In Domestic Orders

CINCINNATI — Further moderate improvement in domestic machinery ordering was recorded in the Cincinnati area during the past week. Increased local demand for grinding, milling and broaching machinery was most notable in the week's report. Lathes continue to hold better domestic than foreign interest, but others still reveal an export preponderance. A Government order for six lathes was the largest reported, other bookings being in one or two unit lots. Automobile and agricultural machinery manufacturers are in the market for new tools and orders last week were reported from these sources. Heavy tools are unchanged. Production is averaging about 50 per cent of factory capacity, with a few machine tool builders running night shifts.

Orders Light, Undertone Strong In Northern Ohio

CLEVELAND — The domestic market continues with a strong undertone even though actual orders this month are not as numerous as in December. Operations in some of the local producers' shops are still less than a full week. Included in inquiries are propositions for the Westinghouse plants at Lima, Cleveland, and Mansfield, and there is talk that a railroad may be in the market before long. A downstate manufacturer of steel mill equipment bought machine tools recently and there have been other scattered orders from diversified industries this month. Local dealers hear that one or two companies already manufacturing cylinder liners are investigating the possibility of additional equipment for expansion. None of this type of business appears ready for closing, however.

Improvement in Sentiment Noted in Middle West

CHICAGO—A slight improvement in sentiment has been noticed here in the past week and at least one sales agency has received several orders. The amount of work on which quotations have been made remains large. The Rock Island Arsenal is inquiring for a vertical spindle, rail type milling machine and a small hydraulic press. International Harvester Co.'s retooling program remains the only large industrial project in sight.

Equipment Buying for 1940 Models Yet to Start

DETROIT—Predictions that the automobile show and announcement of new models will be a month to six weeks earlier next fall than last year lead to the belief that 1940 programs will develop shortly. This will permit an early estimate of the degree of machine tool activity which will be experienced in Detroit and vicinity during the spring and summer. The first definite signs of a program on the light car which Packard is planning have come in the form of inquiries on some parts. However, on both the Packard and the new light Studebaker, it appears probable that engines will be manufactured on the same lines with present engines, limiting the amount of new equipment which will be needed.

74 Hulls Launched By Dravo During 1938

SEVENTY-FOUR hulls, with a total tonnage of 40,498, were built and launched by Dravo Corp., Pittsburgh and Wilmington, Del., during the year 1938. This places Dravo third among all American shipbuilders in total tonnage launched for that year. The largest single item in the production schedule was 44 hopper type coal barges, accounting for 20,768 gross tons.

Welding Research Committee Announces $100,000 Program

A $100,000 program of welding research will be carried out in 1939 by the welding research committee of the Engineering Foundation, New York. The research is coordinated by the committee in cooperation with leading scientific talent in the field, according to William Spraragen, technical secretary. More than 70 individual projects are in progress in universities throughout the nation. Test data for determining design values in the various building codes are being secured.

Investigations now being conducted at the University of Illinois determine accurately the number of cycles of repeated stresses which the various types of joints can withstand under the loads which they will be called upon to carry in these structures. The new alloy steels which are so prominent in all phases of transportation because of their light weight and high strength, present difficult problems to these welding engineers.

Their findings, in turn, influence the steel maker in so proportioning the alloys in the steels that they may be readily weldable, states Mr. Spraragen.

. . . CANADA . . .

. . . Government to spend $60,000,000 or more on armaments.

TORONTO, Jan. 31—Demand for steel and finished products in the Canadian market continues to improve; sales are running to better volume than those for the corresponding period last year.

Announcement is made from Ottawa that the Federal Government proposes to spend upward of $60,000,000 on war equipment to include airplanes, munitions and general war supplies.

Algoma Steel Corp., Sault Ste. Marie, Ont., is starting up its rail mill in the expectation that large contracts will be forthcoming for rails from the Canadian railroads and also to roll rails for which it already has orders.

Merchant pig iron sales are holding at a good level. Melters are showing more interest in the market and repeat orders have been more numerous during the past two or three weeks. Only four stacks are in blast.

Trading in iron and steel scrap is following the line of betterment in the other branches of the steel industry and some local dealers state they are finding a good market for scrap.

Foundry Equipment Convention Postponed

THE annual meeting of the Foundry Equipment Manufacturers Association which was to be held at the Terminal Club, Cleveland, on Feb. 14, has been postponed until fall. The time and place of the meeting will be announced later.